Rate(speed) of Reaction

Question Paper 3

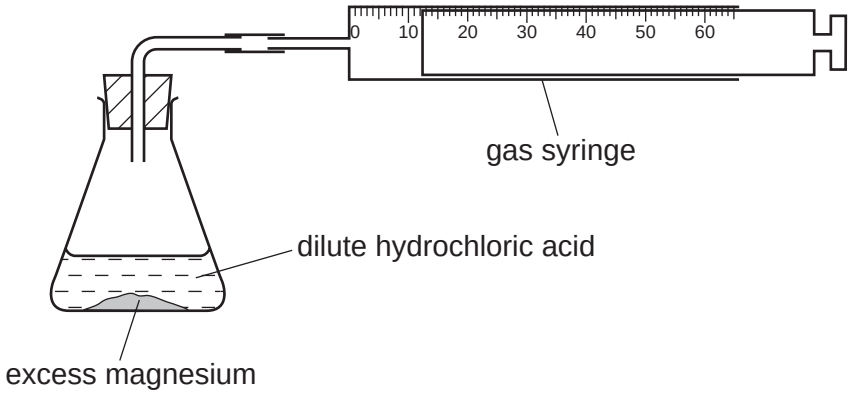
Level	IGCSE
Subject	Chemistry
Exam Board	CIE
Topic	Chemical Reactions
Sub-Topic	Rate (speed) of Reactions
Paper Type	Alternative to Practical
Booklet	Question Paper 3

Time Allowed: **42 minutes**

Score: **/35**

Percentage: **/100**

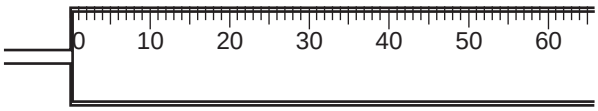
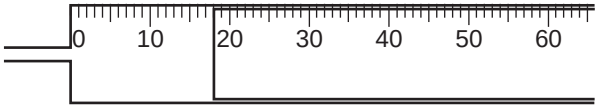
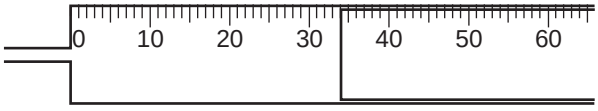
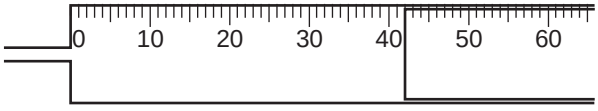
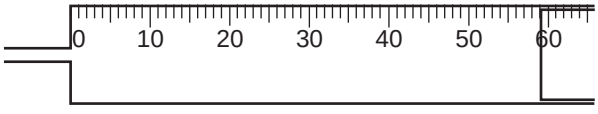
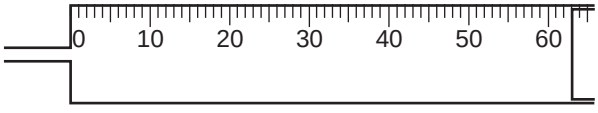
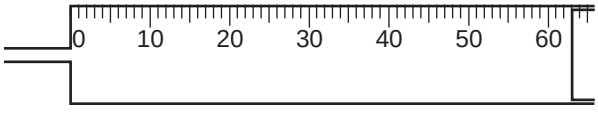
1 The speed of reaction between excess magnesium and dilute hydrochloric acid was investigated using the apparatus below.



The volume of hydrogen produced was measured every minute for six minutes.

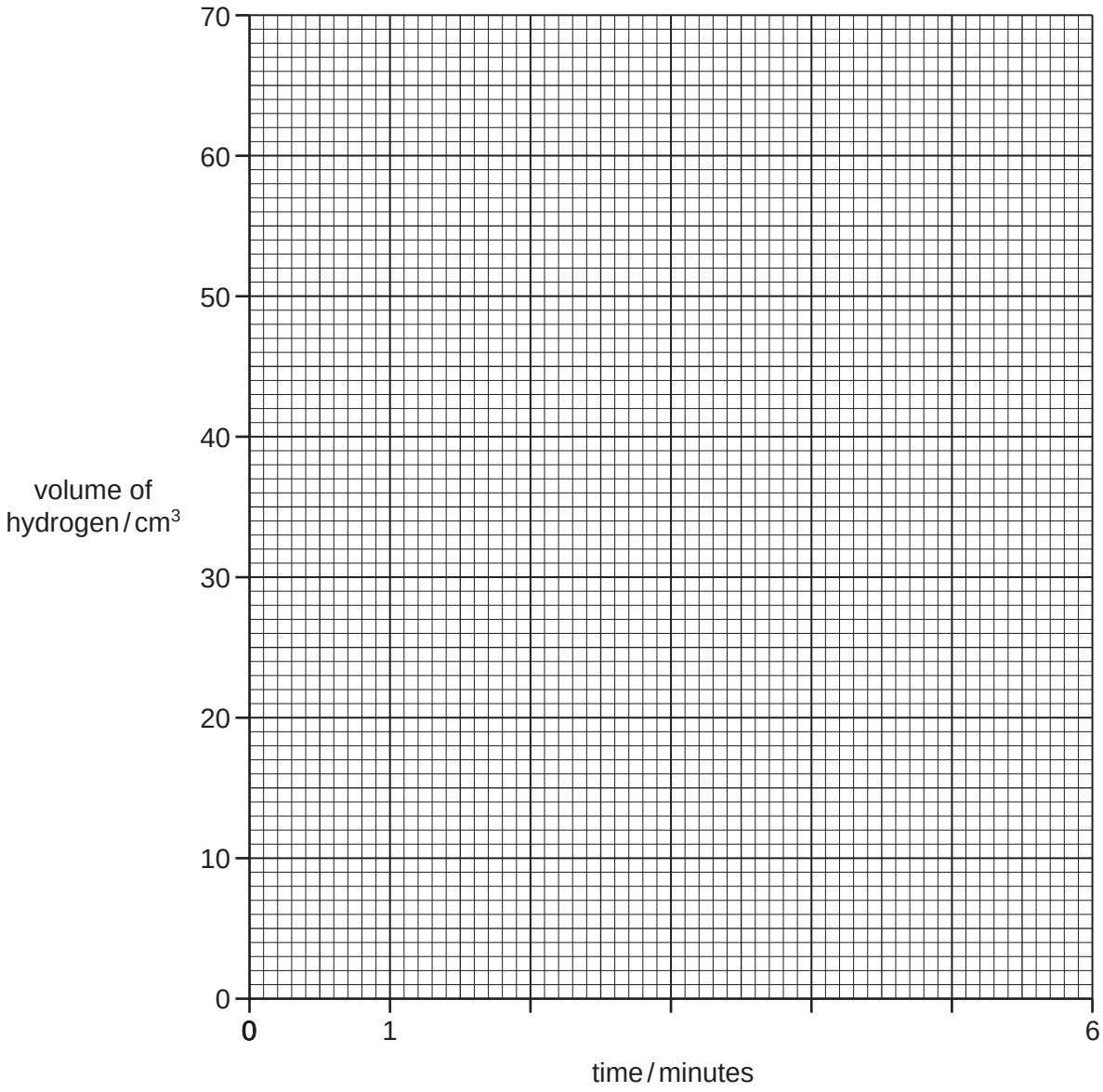
(a) Use the gas syringe diagrams to complete the table.

Table of results

time / minutes	gas syringe diagram	volume of hydrogen / cm^3
0		
1		
2		
3		
4		
5		
6		

[4]

(b) Plot the results on the grid below. Draw a smooth line graph.



[4]

(c) Why is the volume of gas given off the same at 5 minutes and 6 minutes?

.....

..... [1]

(d) Which point appears to be inaccurate? Explain why.

.....

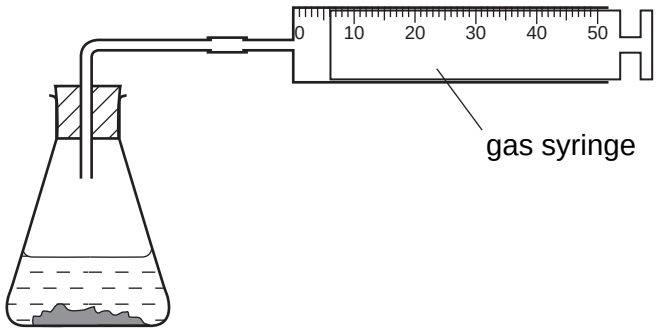
..... [2]

(e) Sketch on the grid the graph you would expect if the experiment were repeated using the same volume of acid which was half as concentrated. [2]

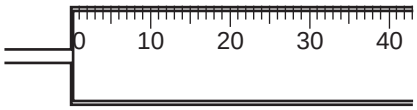
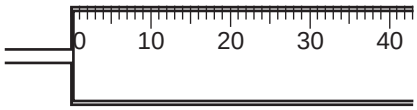
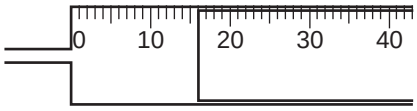
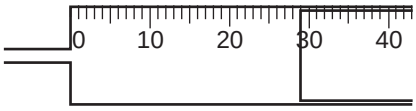
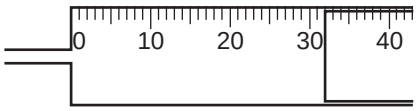
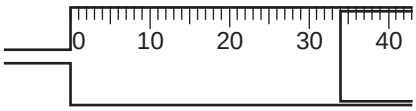
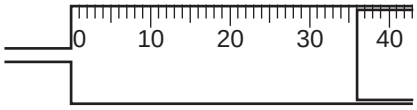
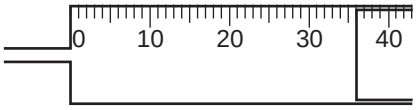
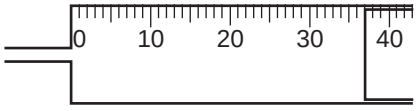
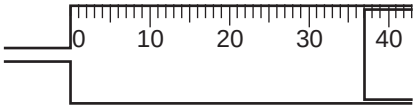
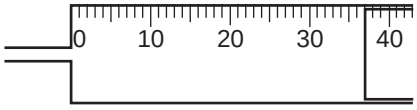
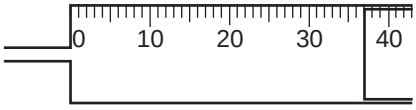
[Total: 13]

2 Hydrogen peroxide breaks down to form oxygen.

The volume of oxygen given off can be measured using the apparatus below.



Solids **W** and **X** both catalyse the breakdown of hydrogen peroxide. The syringe diagrams show the volume of oxygen formed every 20 seconds using these catalysts at 25 °C.

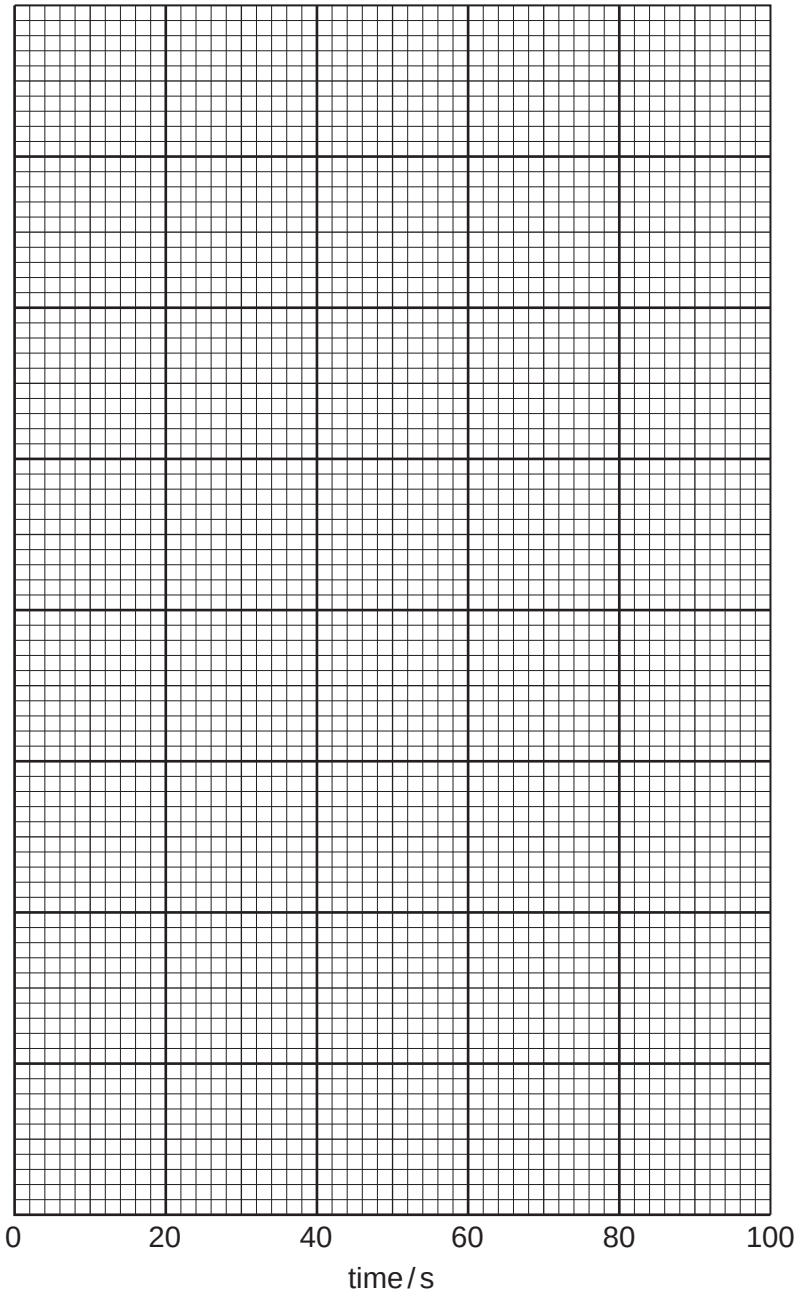
time / s	using catalyst **W**	using catalyst **X**
0		
20		
40		
60		
80		
100		

(a) Use the gas syringe diagrams to complete the table.

time / s	volume of oxygen / cm^3	
	catalyst **W**	catalyst **X**
0		
20		
40		
60		
80		
100		

[3]

(b) Plot a graph to show each set of results. Clearly label the curves.



[6]

(c) Which solid is the better catalyst in this reaction? Give a reason for your choice.

solid .....

reason .....

..... [2]

(d) Why is the final volume of oxygen the same in each experiment?

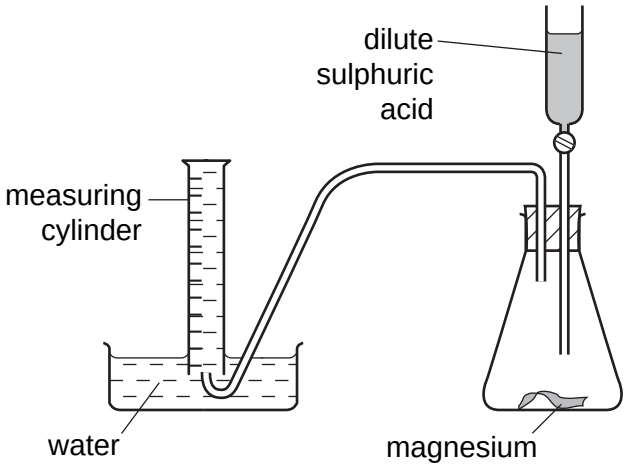
.....

[1]

(e) Sketch a line on the grid to show the shape of the graph you would expect if the reaction with catalyst **X** was repeated at 40 °C. [2]

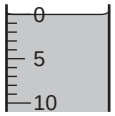
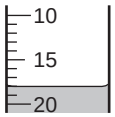
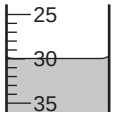
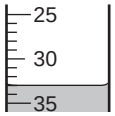
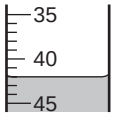
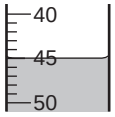
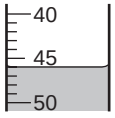
[Total: 14]

3 Magnesium reacts with dilute sulphuric acid to form hydrogen gas. The speed of the reaction was investigated using the apparatus below.



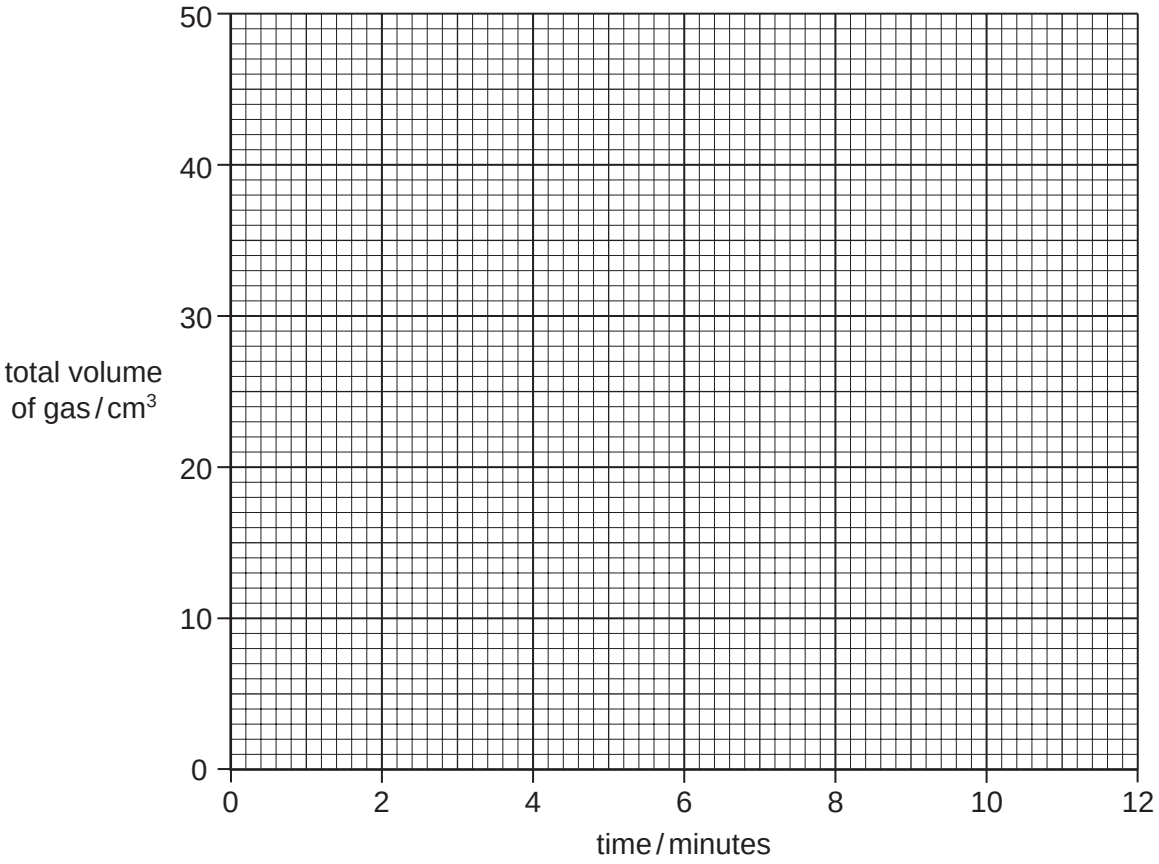
In an experiment 50 cm^3 of dilute sulphuric acid was added to a large piece of magnesium. A student measured the total volume of gas produced at 2 minute intervals.

Use the measuring cylinder diagrams to complete the table.

time / minutes	measuring cylinder diagram	total volume of collected / cm^3
0		
2		
4		
6		
8		
10		
12		

[3]

(a) Plot the student's results on the grid. Use the points to draw a smooth line graph.



[3]

(b) **(i)** At which time does the result appear to be inaccurate?

.....

[1]

(ii) Use the graph to deduce what the correct volume should be at this time.

.....

[1]

[Total:8]