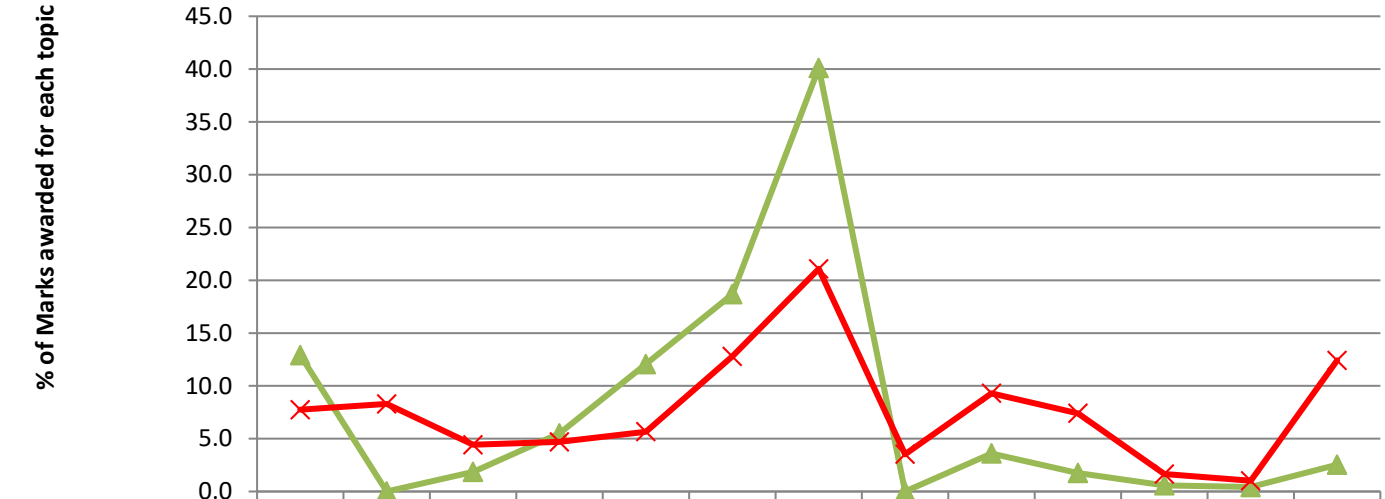
iG Chem 7 EQ P6 15w to 01w 353marks

PAPER 6 v P1, 3 & 6

Percentage of all marks awarded for each topic from w2001 to in paper 6 (green triangle) and for all papers (red crosses)



	1	3	4	5	6	7	8	9	10	11	12	13	14
P6 2001-15	12.9	0.0	1.9	5.5	12.1	18.7	40.1	0.0	3.6	1.7	0.6	0.4	2.5
P1,3, 6 2001-15	7.7	8.3	4.4	4.7	5.7	12.8	21.1	3.5	9.3	7.4	1.7	1.0	12.4

Topic Number

7 Chemical reactions

7.1 Physical and chemical changes

Core

- Identify physical and chemical changes, and understand the differences between them

7.2 Rate (speed) of reaction

Core

- Describe and explain the effect of concentration, particle size, catalysts (including enzymes) and temperature on the rate of reactions
- Describe the application of the above factors to the danger of explosive combustion with fine powders (e.g. flour mills) and gases (e.g. methane in mines)
- Demonstrate knowledge and understanding of a practical method for investigating the rate of a reaction involving gas evolution
- Interpret data obtained from experiments concerned with rate of reaction

Note: Candidates should be encouraged to use the term *rate* rather than *speed*.

Supplement

- Devise and evaluate a suitable method for investigating the effect of a given variable on the rate of a reaction
- Describe and explain the effects of temperature and concentration in terms of collisions between reacting particles. (An increase in temperature causes an increase in collision rate **and** more of the colliding molecules have sufficient energy (activation energy) to react whereas an increase in concentration only causes an increase in collision rate.)

7.4 Redox

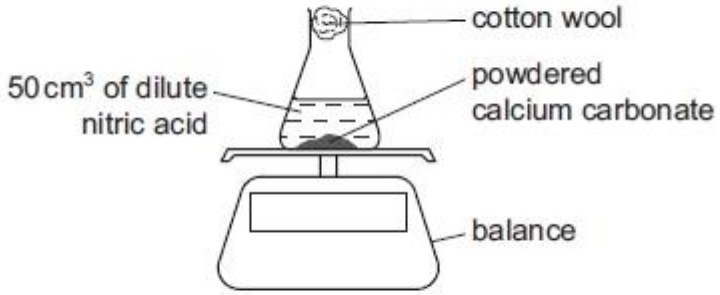
Core

- Define *oxidation* and *reduction* in terms of oxygen loss/gain. (Oxidation state limited to its use to name ions, e.g. iron(II), iron(III), copper(II), manganate(VII).)

Supplement

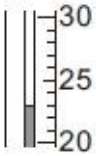
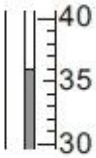
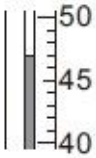
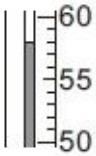
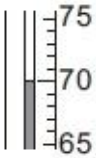
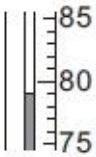
- Define *redox* in terms of electron transfer
- Identify redox reactions by changes in oxidation state and by the colour changes involved when using acidified potassium manganate(VII), and potassium iodide. (Recall of equations involving $KMnO_4$ is **not** required.)
- Define *oxidising agent* as a substance which oxidises another substance during a redox reaction. Define *reducing agent* as a substance which reduces another substance during a redox reaction.
- Identify oxidising agents and reducing agents from simple equations

3 A teacher demonstrated the rate of reaction of dilute nitric acid with powdered calcium carbonate at different temperatures.
50 cm^3 of dilute nitric acid was heated to a known temperature and placed on a balance.



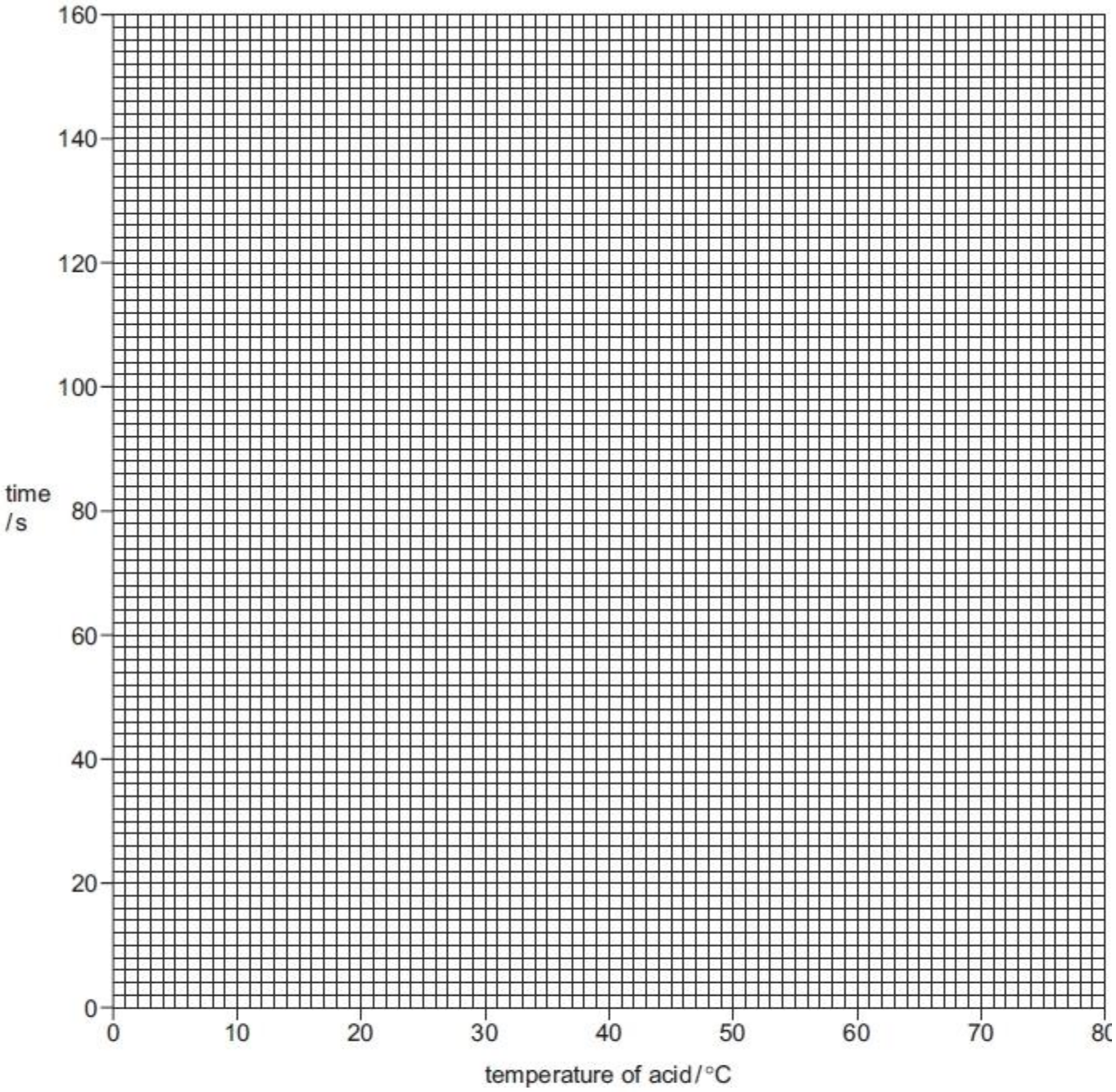
Excess powdered calcium carbonate was added to the nitric acid and the mass of the beaker and contents recorded. The time taken for the mass to decrease by 1 g was measured. The experiment was repeated at different temperatures.

(a) Using the thermometer diagrams, record the temperatures in the table.

thermometer diagram	temperature of nitric acid / °C	time for mass to decrease by 1 g in seconds
		139
		102
		99
		60
		45
		38

[3]

(b) Plot the results on the grid and draw a smooth line graph.



[3]

(c) Which point is inaccurate? Explain why you chose this point.

.....

..... [2]

(d) **Use your graph** to find out the time of reaction at a temperature of 30 °C. Show clearly on the grid how you obtained your answer.

..... [3]

(e) (i) How does the rate of this reaction vary with the change in temperature?

..... [1]

(ii) Explain why.

.....

.....

..... [2]

(f) (i) What would be the effect of repeating the experiments using lumps of calcium carbonate instead of powdered calcium carbonate? Explain your answer.

.....

..... [2]

(ii) Sketch on the grid the curve you would expect. [1]

(g) Explain why cotton wool was used in the neck of the conical flask.

.....

..... [2]

Q# 2/ iGCSE Chem/2015s/Paper 6/

6 A catalyst is a substance that speeds up the rate of a chemical reaction and remains unchanged at the end of the reaction.
Hydrogen peroxide solution, H_2O_2, breaks down to form oxygen. This decomposition is very slow if a catalyst is not used.
Plan an investigation to show that copper(II) oxide is a suitable catalyst for this reaction.
You can use aqueous hydrogen peroxide and common laboratory apparatus.

Step 1 Show that copper(II) oxide catalyses the decomposition of hydrogen peroxide and measure the rate of the reaction.

.....

.....

.....

.....

.....

.....

.....

.....

Step 2 Show that the copper(II) oxide is unchanged at the end of the decomposition.

.....

.....

.....

.....

.....

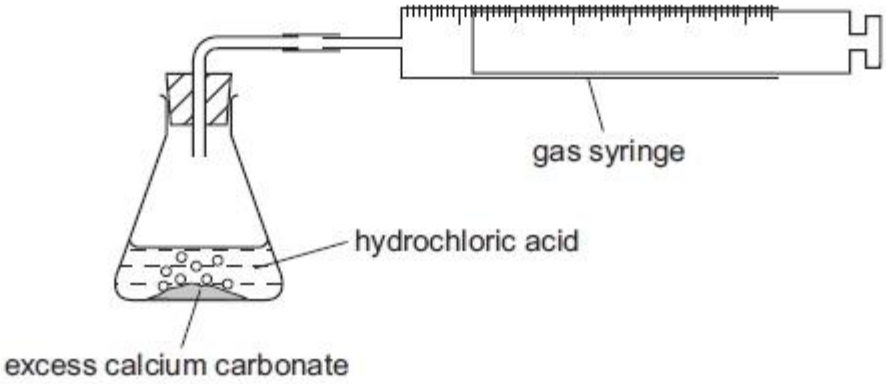
.....

.....

[Total: 8]

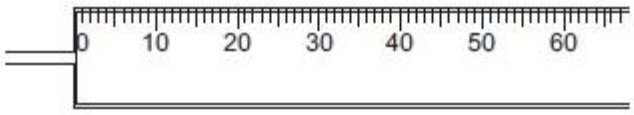
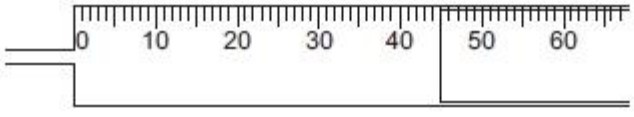
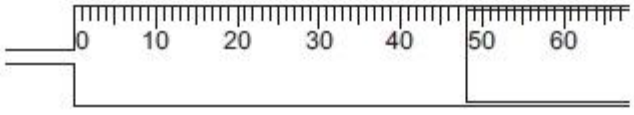
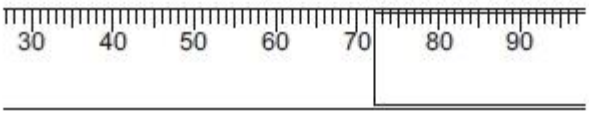
Q# 3/ iGCSE Chem/2015march/Paper 6/

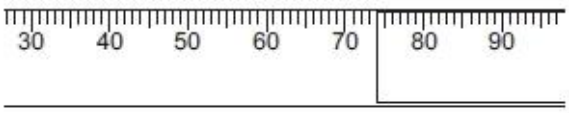
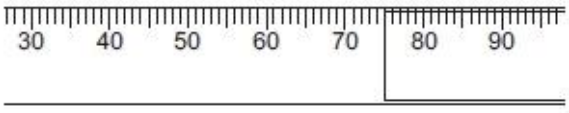
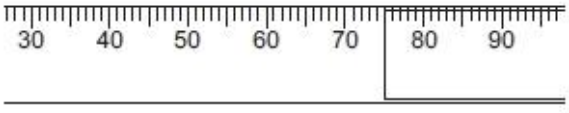
2 The rate of reaction between excess calcium carbonate and dilute hydrochloric acid was investigated using the apparatus shown below. The temperature of the hydrochloric acid was 25 °C.



The volume of carbon dioxide evolved was measured every minute for six minutes.

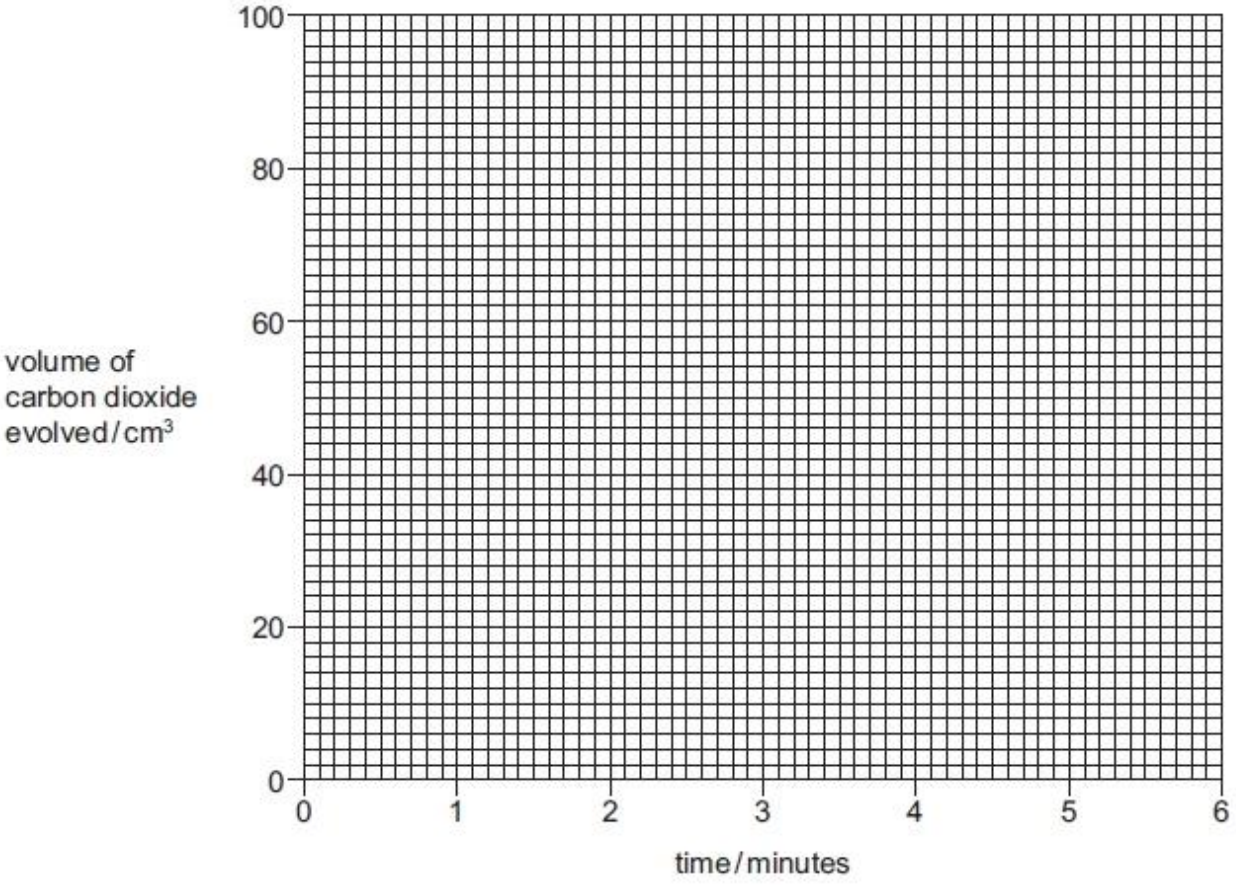
(a) Use the gas syringe diagrams to complete the table of results.

time / minutes	gas syringe diagram	total volume of carbon dioxide evolved / cm^3
0		
1		
2		
3		

4		
5		
6		

[3]

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



[4]

(c) **(i)** Which point appears to be inaccurate? Explain why.

.....

..... [2]

(ii) **Use your graph** to work out the volume of gas expected at that time. Show clearly **on the grid** how you worked out your answer.

..... [2]

(d) Sketch, **on the grid**, the graph you would expect if the experiment was repeated using hydrochloric acid at a temperature of 50 °C. [2]

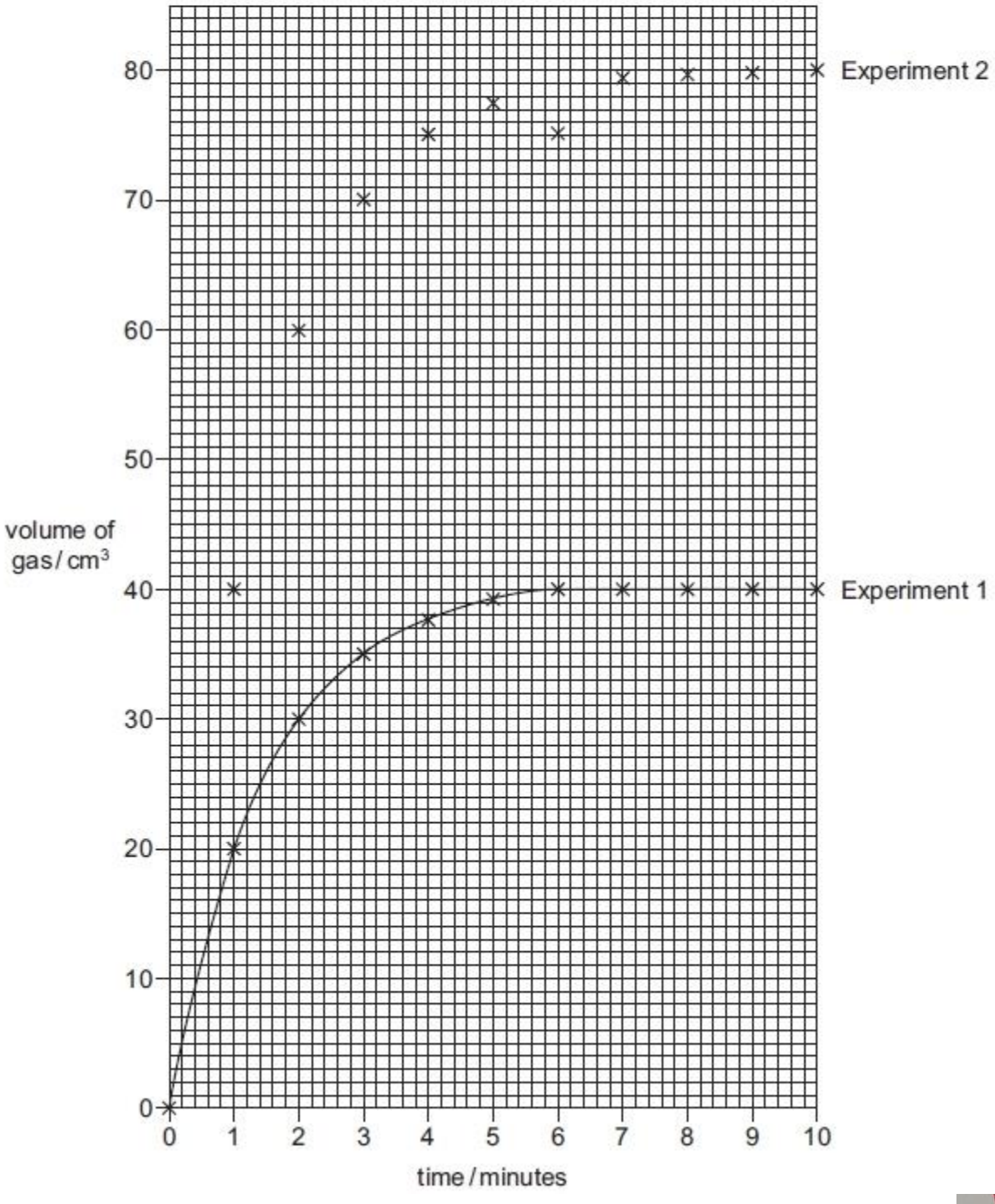
2 Two experiments were carried out to show what factors affect the rate of decomposition of hydrogen peroxide, H_2O_2.
In each experiment the volume of gas produced was measured every minute for ten minutes.

Experiment 1

The student used a mixture of 50 cm^3 of hydrogen peroxide, 50 cm^3 of water and 1 g of manganese(IV) oxide at a room temperature of 20 °C.
The results were plotted to obtain the graph shown.

Experiment 2

The student repeated Experiment 1 but did not record how much of each substance was used. The points were plotted on the grid.



(a) Complete the graph for Experiment 2. [1]

(b) Suggest the composition of the mixture used in Experiment 2. Explain your suggestion.

composition .....

.....

explanation .....

..... [4]

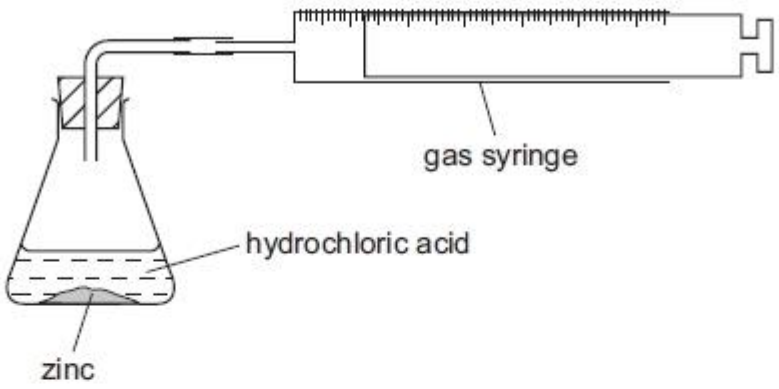
(c) What is the function of the manganese(IV) oxide?

..... [1]

(d) Sketch on the grid the curve that you would expect if Experiment 1 was repeated at 10 °C. [2]

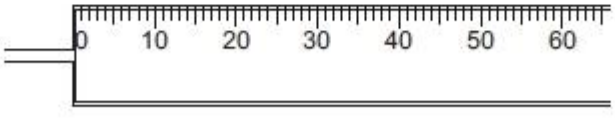
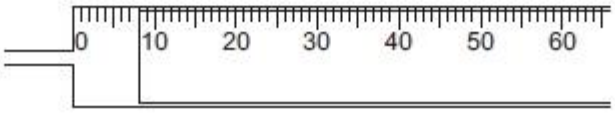
Q# 5/ iGCSE Chem/2014s/Paper 6/

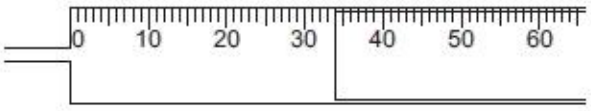
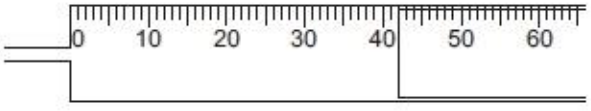
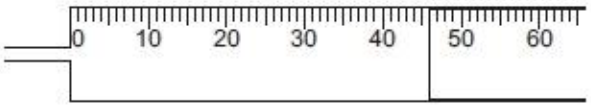
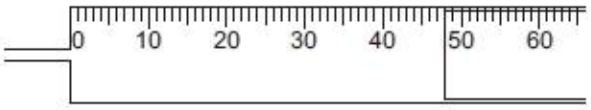
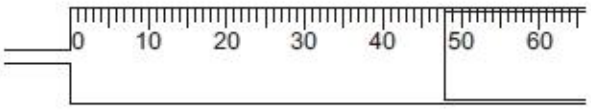
3 A student investigated the reaction of zinc powder with dilute hydrochloric acid using the apparatus below.



The same mass of zinc was added to different volumes of hydrochloric acid at room temperature, 20 °C. The total volume of hydrogen gas given off in each experiment was measured.

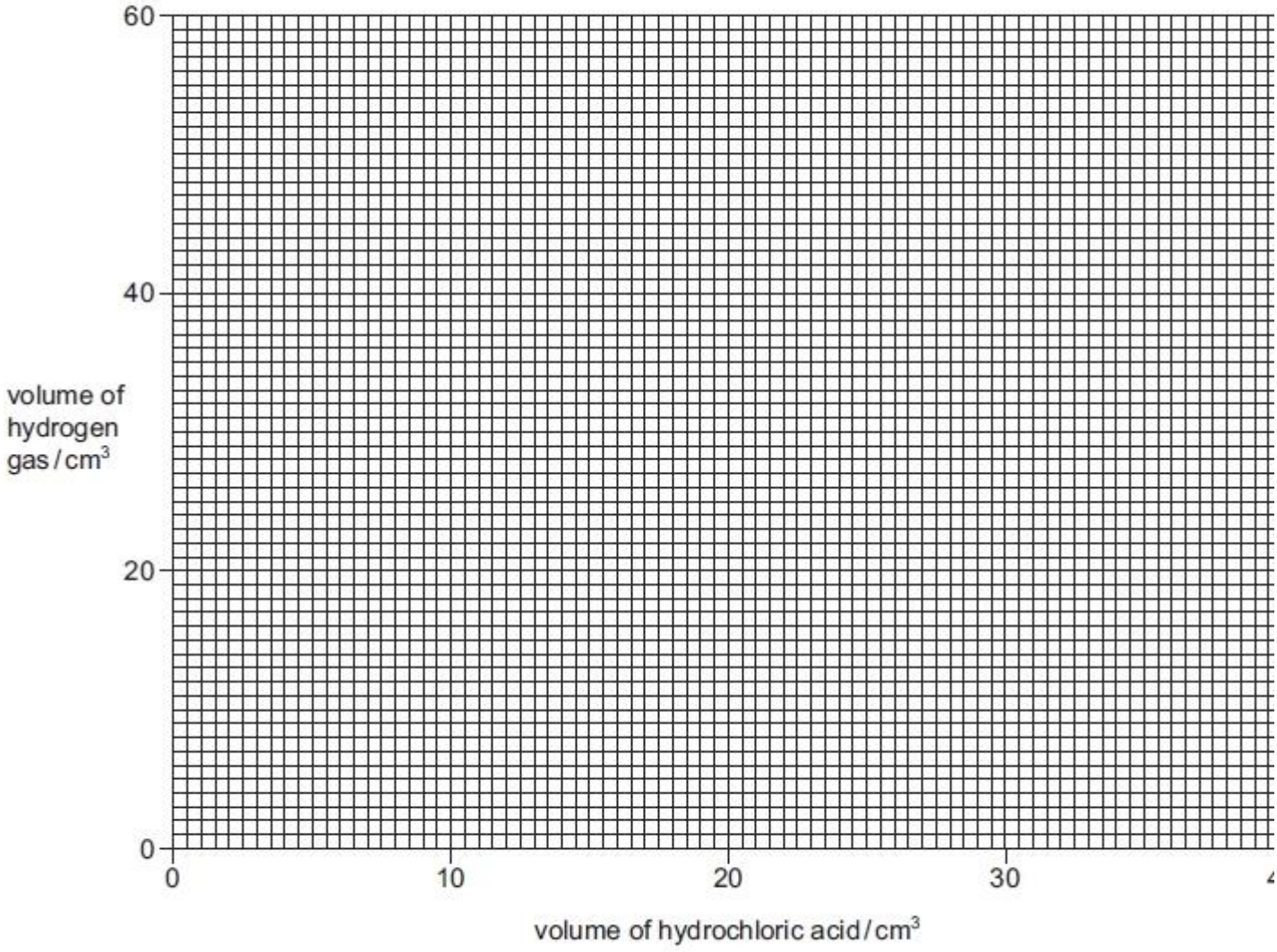
(a) Use the gas syringe diagrams to record the volumes of hydrogen gas in the table.

volume of hydrochloric acid / cm^3	gas syringe diagram	volume of hydrogen gas / cm^3
0		
5		

10		
15		
20		
30		
40		

[3]

(b) On the grid, plot the points and draw a smooth line graph.



[4]

(c) (i) Which point is inaccurate?

..... [1]

(ii) Suggest a possible reason for this inaccurate measurement.

..... [1]

(iii) **Use your graph** to work out the volume that would be expected to be formed.
Show clearly **on the grid** how you got your answer.

..... [2]

(d) Explain why the volume of hydrogen gas does not increase after 30 cm^3 of hydrochloric acid.

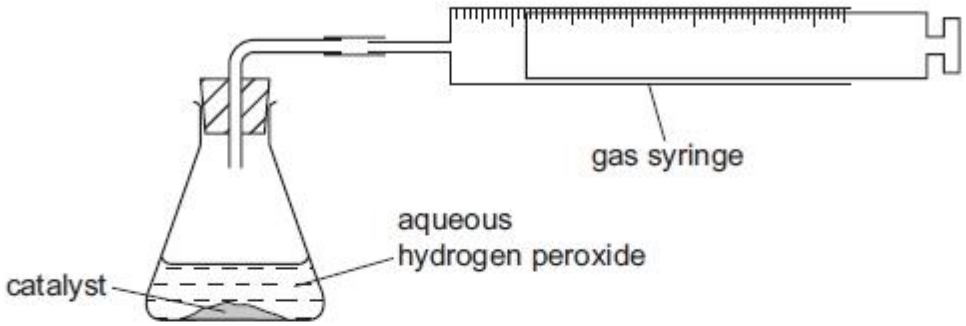
.....

..... [2]

(e) Sketch on the grid the graph you would expect if the experiments were repeated using the same mass of zinc granules. [2]

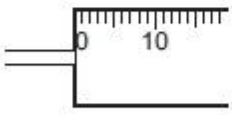
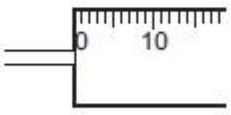
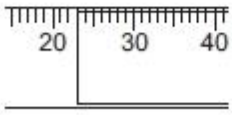
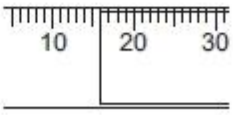
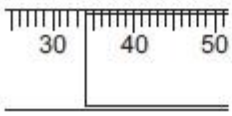
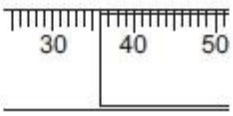
Q# 6/ iGCSE Chem/2013/w/Paper 6/

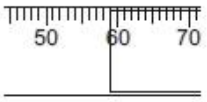
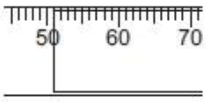
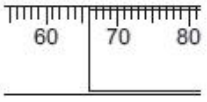
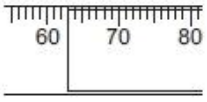
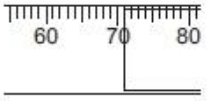
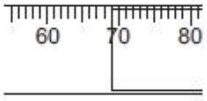
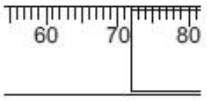
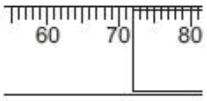
5 Two experiments using catalysts were carried out. Catalysts **R** and **S** were used to break down 50 cm^3 of aqueous hydrogen peroxide at a temperature of 20 °C. The volume of oxygen given off was measured using the apparatus shown.



The gas syringe diagrams show the volume of oxygen formed every 30 seconds in each experiment.

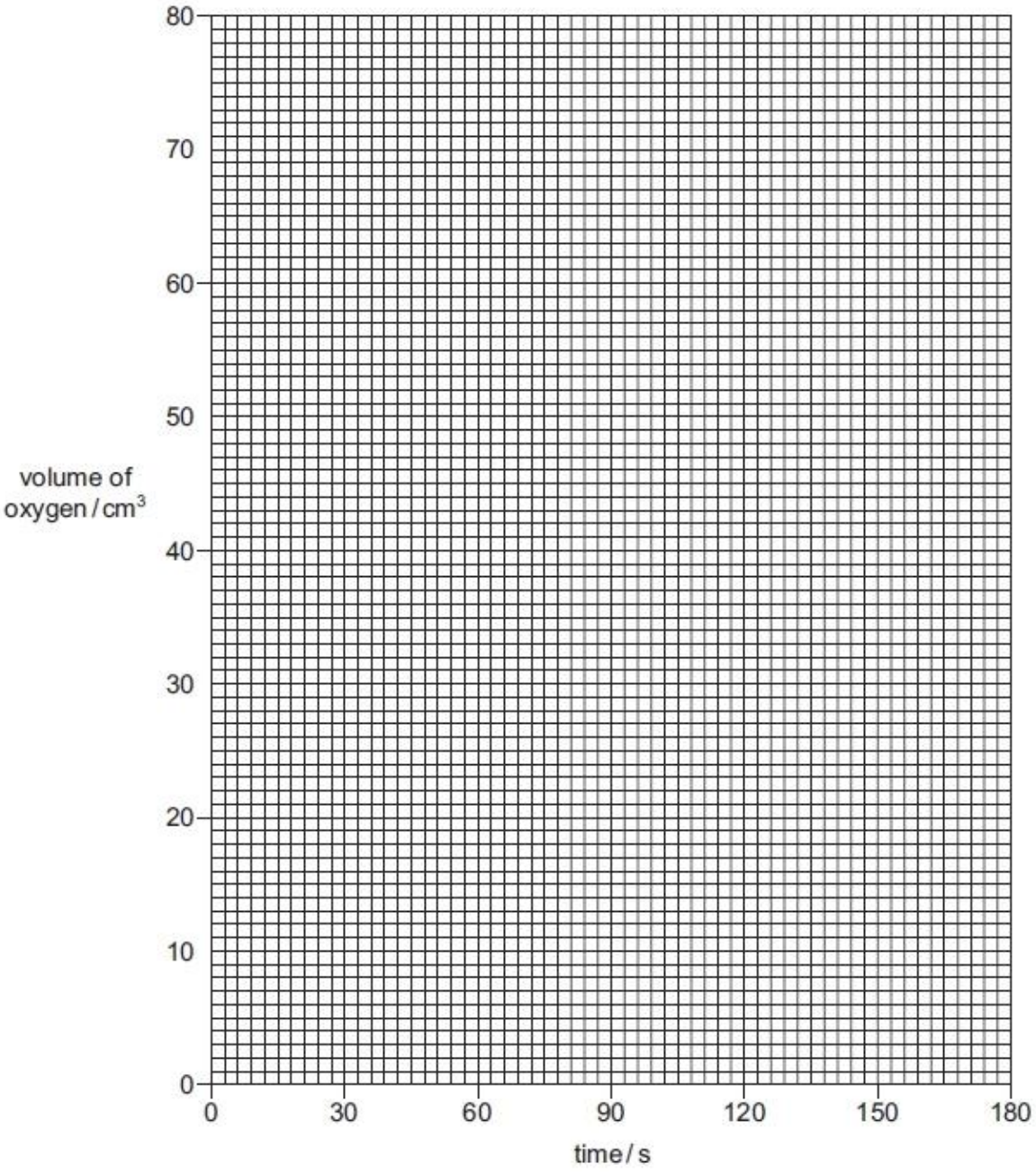
(a) Use the syringe diagrams to complete the volumes in the table.

time / s	using catalyst **R**		using catalyst **S**	
	syringe diagram	volume / cm^3	syringe diagram	volume / cm^3
0				
30				
60				

90				
120				
150				
180				

[4]

(b) Plot a graph to show each set of results. Clearly label the graphs **R** and **S**.



[6]

(c) Which result using catalyst **R** was inaccurate?

..... [1]

(d) Which is the better catalyst in this reaction? Explain your answer.

.....

..... [2]

(e) Sketch a line on the grid to show the graph you would expect if the reaction with catalyst **R** was repeated at 50 °C. [2]

Q# 7/ iGCSE Chem/2013/w/Paper 6/

6

Old documents

Some documents are stored in containers with packets of silica gel crystals. These crystals absorb water from air that enters the container. Water could damage the documents.
Anhydrous cobalt(II) chloride is added to the silica gel. As the crystals absorb water they change colour from blue to pink. Heating the silica gel in an oven removes the water from the crystals so that the crystals can be reused.

Plan an experiment to find the mass of water absorbed by a packet of silica gel crystals.

.....

.....

.....

.....

.....

.....

..... [6]

Q# 8/ iGCSE Chem/2012/w/Paper 6/

4 A student investigated the speed of reaction when iodine was produced by the reaction of solution **L** with potassium iodide at different temperatures.

Five experiments were carried out.

Experiment 1

A burette was filled with the aqueous solution **L** to the 0.0 cm^3 mark.
10.0 cm^3 of solution **L** was added from the burette into a boiling tube and the initial temperature of the solution was measured.

Using a measuring cylinder, 5 cm^3 of aqueous potassium iodide and 3 cm^3 of aqueous sodium thiosulfate were poured into a second boiling tube. Starch solution was added to this boiling tube and the mixture shaken.

The mixture in the second boiling tube was added to the solution **L**, shaken and the clock started. These chemicals reacted to form iodine which reacted with the starch. When a blue colour appeared, the clock was stopped and the time measured and recorded in the table. The final temperature of the mixture was measured.

Experiment 2

Experiment 1 was repeated but solution **L** was heated to about 40 °C. The temperature of the solution was measured before adding the mixture in the second boiling tube.
When a blue colour appeared, the clock was stopped and the time measured and recorded in the table. The final temperature of the mixture was measured.

Experiment 3

Experiment 2 was repeated, heating solution **L** to about 50 °C.

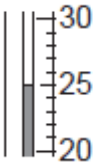
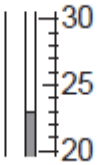
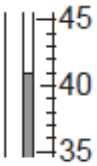
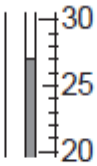
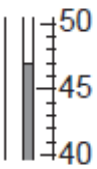
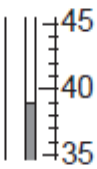
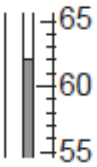
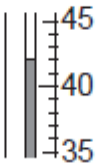
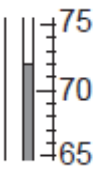
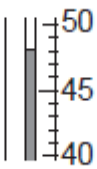
Experiment 4

Experiment 2 was repeated, heating solution **L** to about 60 °C.

Experiment 5

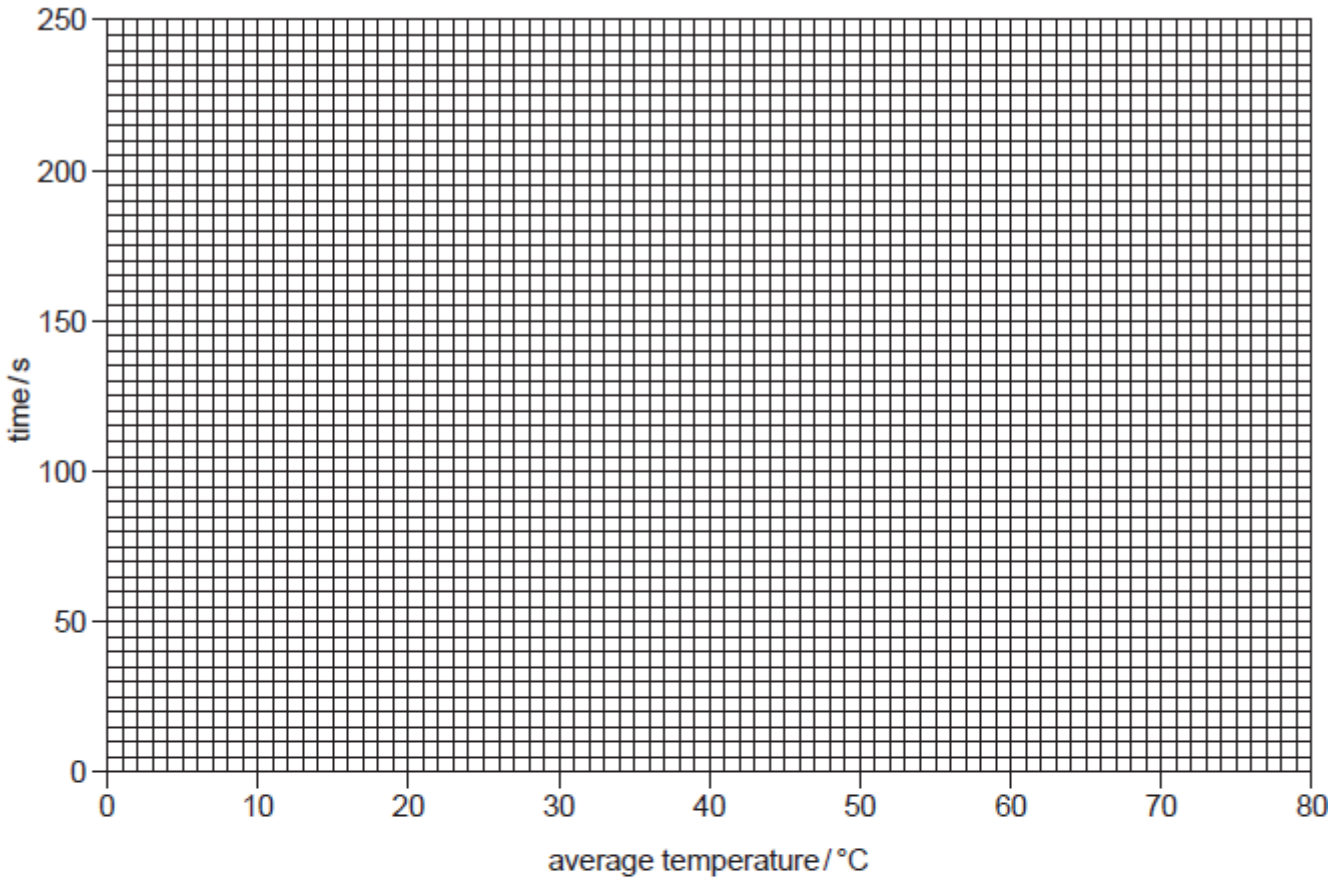
Experiment 2 was repeated, heating solution **L** to about 70 °C.

(a) Use the thermometer diagrams in the table to record the temperatures and complete the table.

experiment	thermometer diagram	initial temperature /°C	thermometer diagram	final temperature /°C	average temperature /°C	time / s
1						215
2						105
3						60
4						40
5						35

[5]

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



[5]

(c) **From your graph**, work out the time taken for the blue colour to appear if solution **L** was heated to 80 °C. The final temperature of the reaction mixture was 64 °C.
Show clearly **on the grid** how you obtained your answer.

..... [2]

(d) Suggest the purpose of the starch solution in the experiments.

..... [1]

(e) **(i)** In which experiment was the reaction speed fastest?

..... [1]

(ii) Explain, using ideas about particles, why this experiment was the fastest.

.....

..... [2]

(f) Predict the effect on the time and speed of the reaction in Experiment 5 if it was repeated using a less concentrated solution of **L**.

time .....

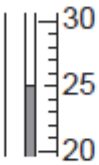
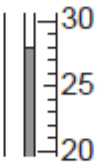
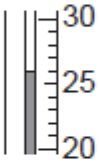
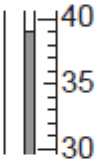
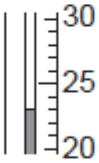
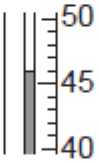
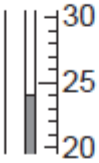
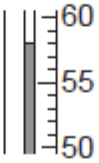
speed ..... [2]

(g) Why was a burette used to measure solution **L** instead of a measuring cylinder?

.....

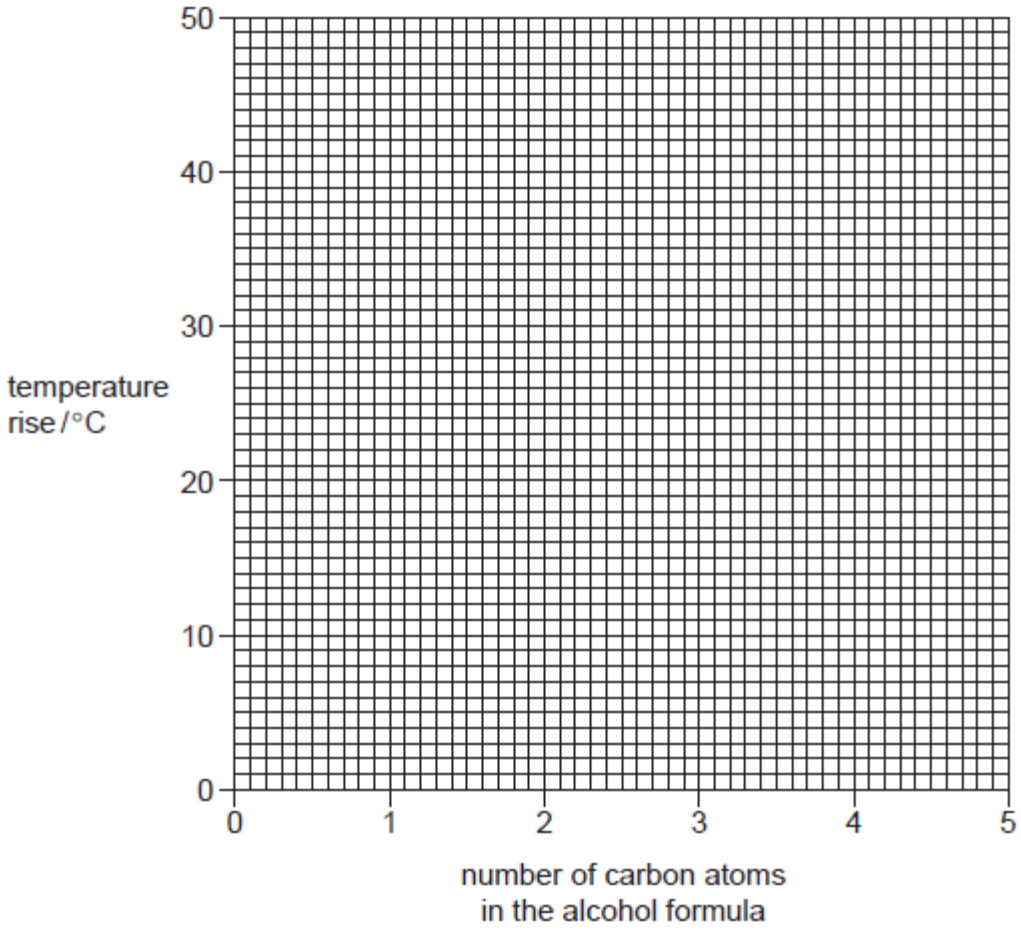
..... [1]

Q# 9/ iGCSE Chem/2012s/Paper 6/ Q2

alcohol	formula	initial		final		temperature rise / °C
		thermometer diagram	temperature / °C	thermometer diagram	temperature / °C	
methanol	CH_3OH					
ethanol	C_2H_5OH					
propanol	C_3H_7OH					
butanol	C_4H_9OH					

[4]

(b) Plot the results obtained on the grid and draw a straight line graph.



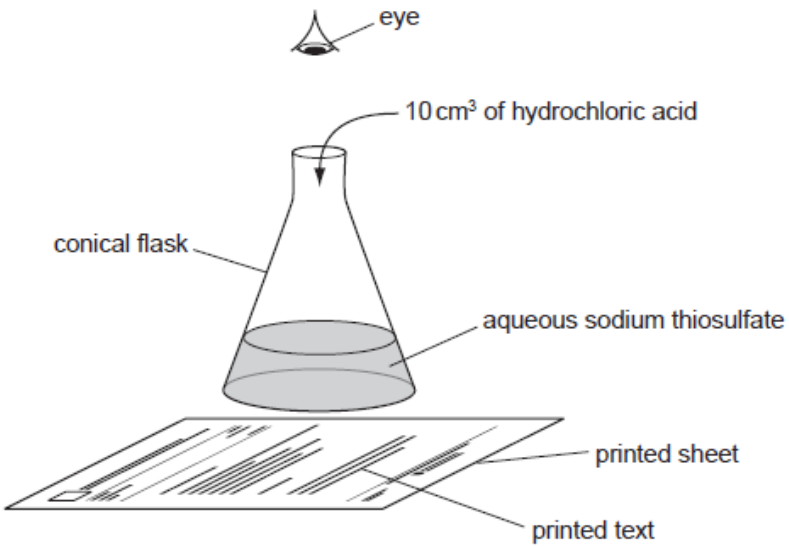
[4]

(c) **From your graph**, work out the temperature rise expected if the experiment was repeated using pentanol, $C_5H_{11}OH$.
Show clearly **on the grid** how you obtained your answer.

..... [3]

Q# 10/ iGCSE Chem/2011s/Paper 6/

2 Hydrochloric acid reacts with aqueous sodium thiosulfate to form a precipitate, which makes the solution turn cloudy.
The formation of the precipitate can be used to show how fast the reaction proceeds, using the apparatus shown below.



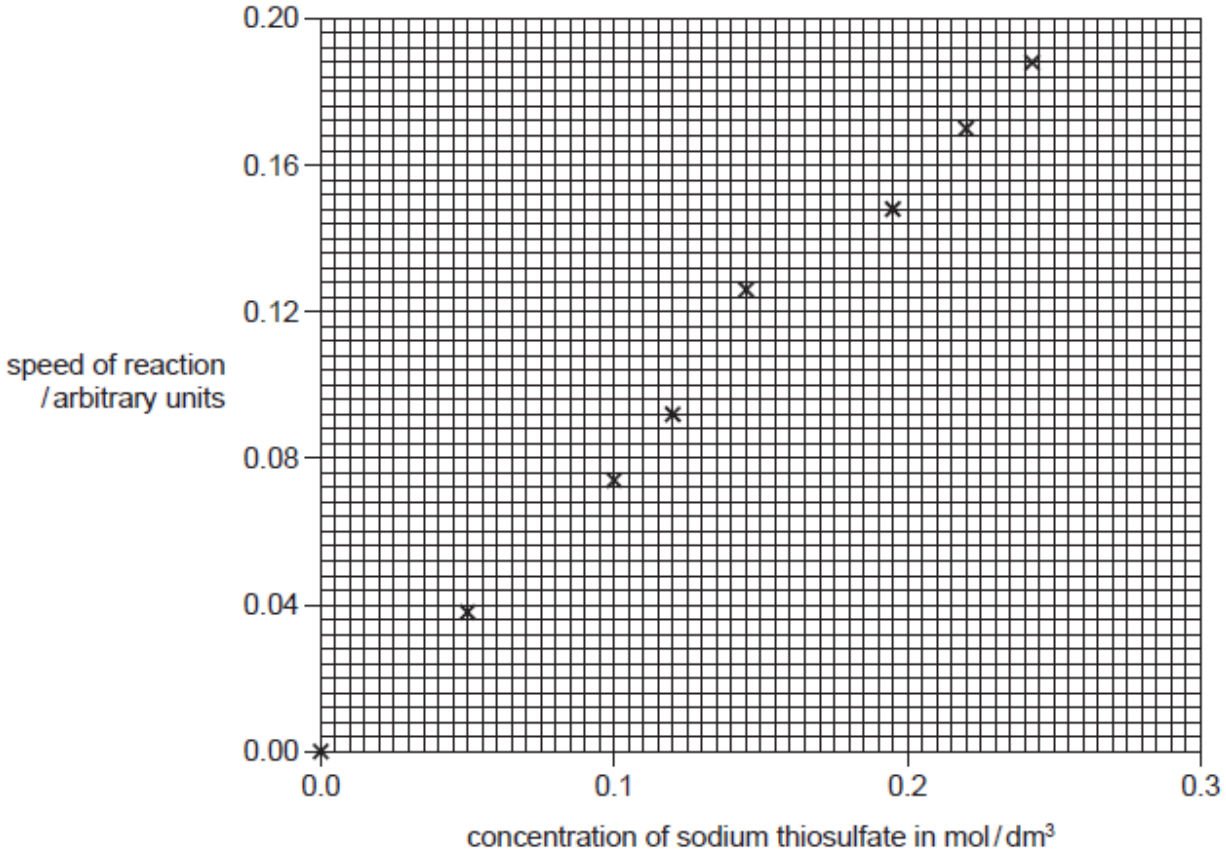
A student used this method to investigate the effect of changing the concentration of the sodium thiosulfate solution on the speed of the reaction.
The student used different concentrations of sodium thiosulfate solution.
All other variables were kept the same.

(a) Give **two** variables which were kept the same in the investigation.

1. .....

2. ..... [2]

The results of the experiments are shown plotted on the grid below.



(b) Draw a line of best fit on the grid. [1]

(c) Suggest **two** reasons why not all of the points lie on the line of best fit.

1. .....

2. ..... [2]

(d) From your graph, deduce the speed of reaction when the concentration of sodium thiosulfate is 0.075 mol / dm³. Show clearly **on the graph** how you worked out your answer.

..... [2]

(e) Explain why the speed of reaction increases when the concentration of sodium thiosulfate is increased.

.....

..... [2]

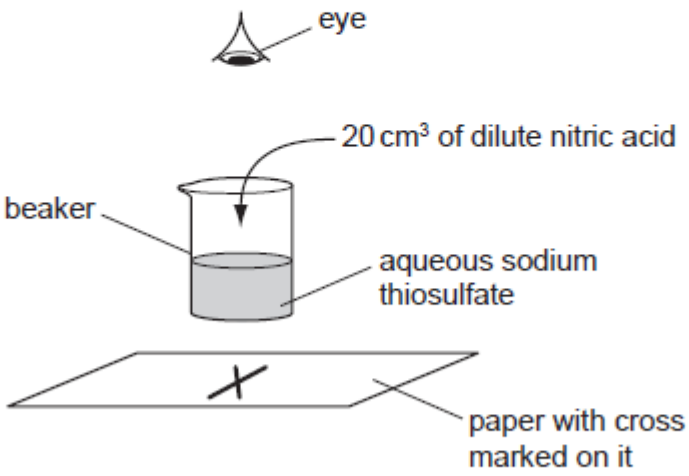
(f) Sketch on the grid the line you would expect if the experiments were repeated at a higher temperature. [1]

Q# 11/ iGCSE Chem/2010/w/Paper 6/

3 A student carried out an experiment to investigate the speed of reaction between sodium thiosulfate solution and dilute nitric acid.
Sulfur is formed during this reaction and the mixture turns cloudy.

Experiment 1

Using a measuring cylinder, 100 cm^3 of sodium thiosulfate solution was poured into a 250 cm^3 beaker. The beaker was placed on a cross drawn on a piece of paper. 20 cm^3 of dilute nitric acid was added to the beaker and the timer started.



The time until the cross could not be seen was taken. The time was recorded in the table.

Experiment 1 was repeated using different volumes of sodium thiosulfate as shown in the table.
All experiments were carried out at 20 °C.

Table of results

experiment	volume of sodium thiosulfate solution / cm^3	volume of water / cm^3	time for cross to disappear / s
1	100	0	10
2	80	20	12
3	40	60	24
4	20	80	51
5	10	90	98

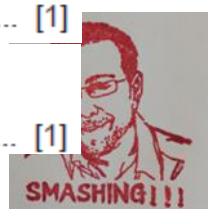
(a) Why was the total volume of solution kept constant?

.....

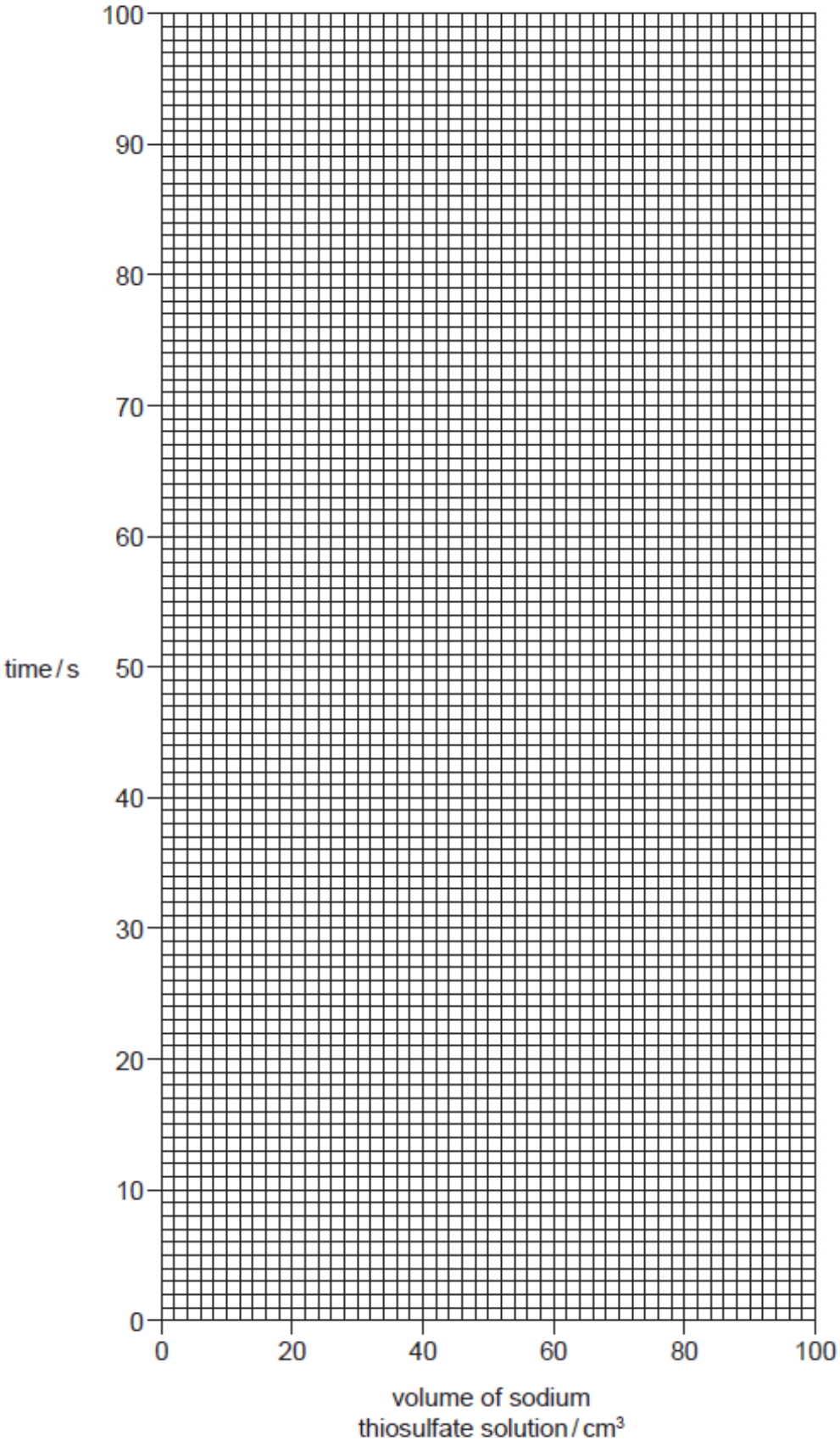
..... [1]

(b) In Experiment 2, which is the last liquid to be added to the beaker?

..... [1]



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



[4]

(ii) **Use your graph** to work out the time taken for the cross to disappear when 55 cm^3 of sodium thiosulfate solution and 45 cm^3 of water were used.
Indicate **on the graph** how you worked out your answer.

.....

[2]

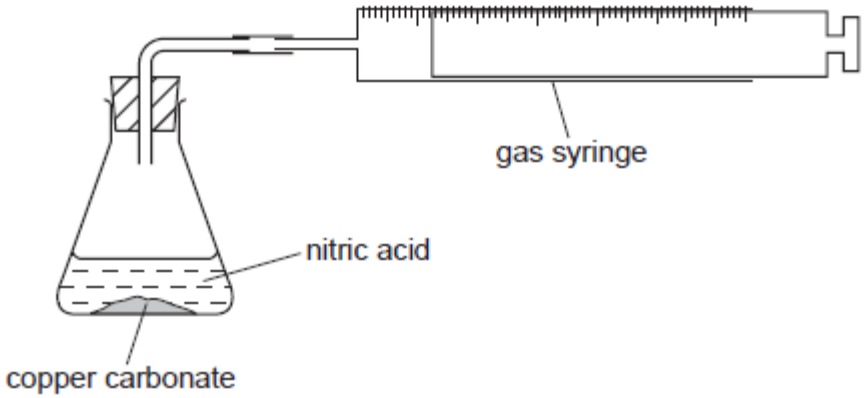
(d) The experiments were repeated at 40 °C. Suggest how the results would differ. Explain your answer.

.....

..... [2]

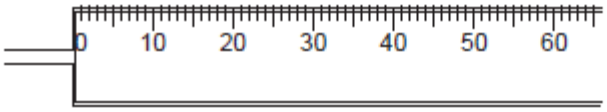
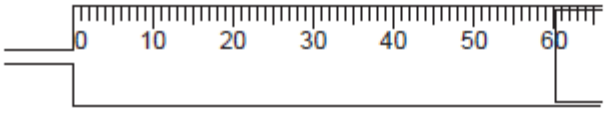
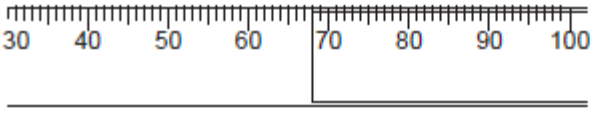
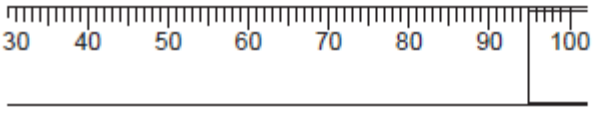
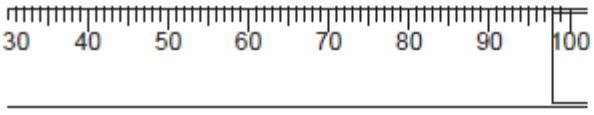
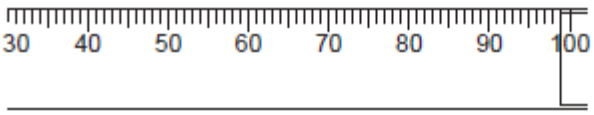
Q# 12/ iGCSE Chem/2010s/Paper 6/

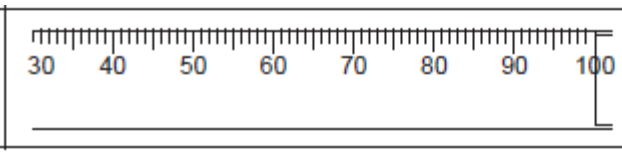
3 The speed of reaction between excess copper carbonate and dilute nitric acid was investigated using the apparatus below.
The temperature of the nitric acid was 20 °C.



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

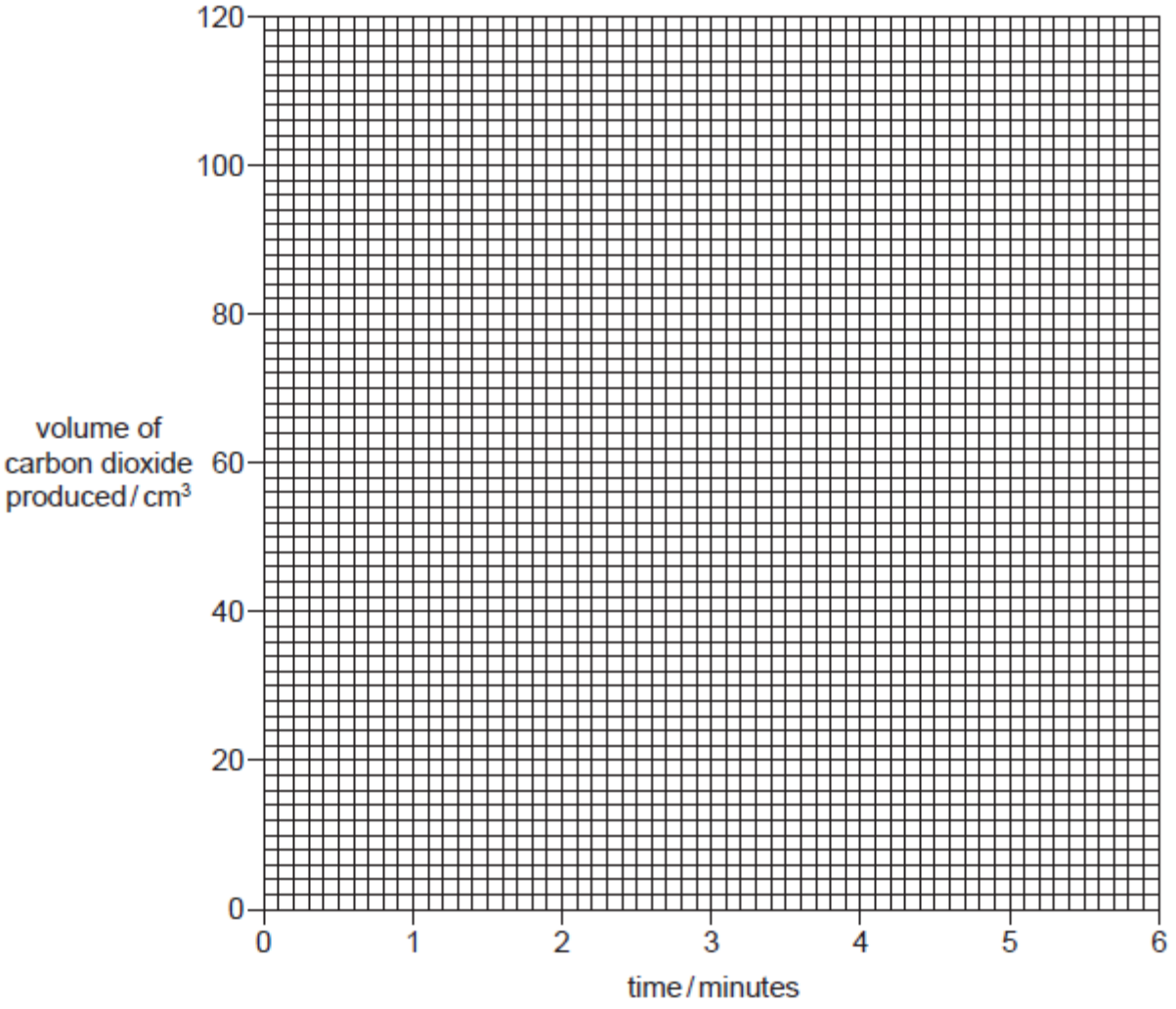
(a) Use the gas syringe diagrams to complete the table of results.

time / minutes	gas syringe diagram	total volume of carbon dioxide produced / cm^3
0		
1		
2		
3		
4		
5		

6		

[4]

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



[4]

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

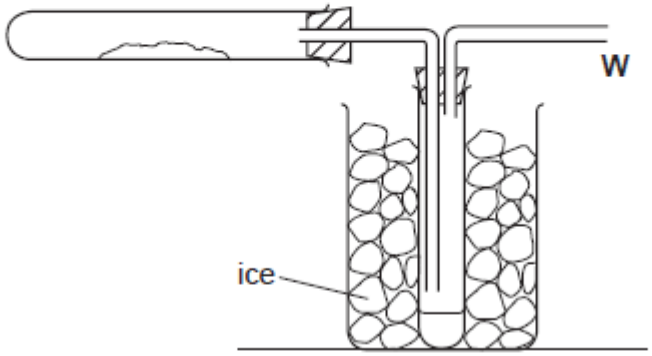
.....

..... [2]

(d) Sketch on the grid, the graph you would expect if the experiment was repeated using nitric acid at a temperature of 60 °C. [2]

Q# 13/ iGCSE Chem/2010s/Paper 6/

6 Hydrated cobalt chloride crystals, $CoCl_2.6H_2O$, were heated in the apparatus shown below.



(a) Indicate on the diagram, using an arrow, where heat is applied. [1]

(b) The crystals change colour from ..... to ..... . [1]

(c) What is the purpose of the ice?

.....

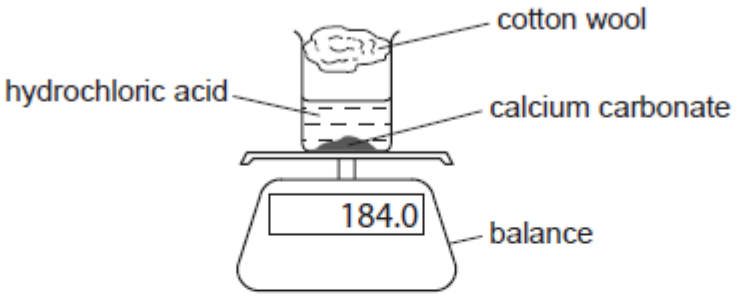
..... [1]

(d) Why is the tube open at point **W**?

..... [1]

Q# 14/ iGCSE Chem/2009/w/Paper 6/

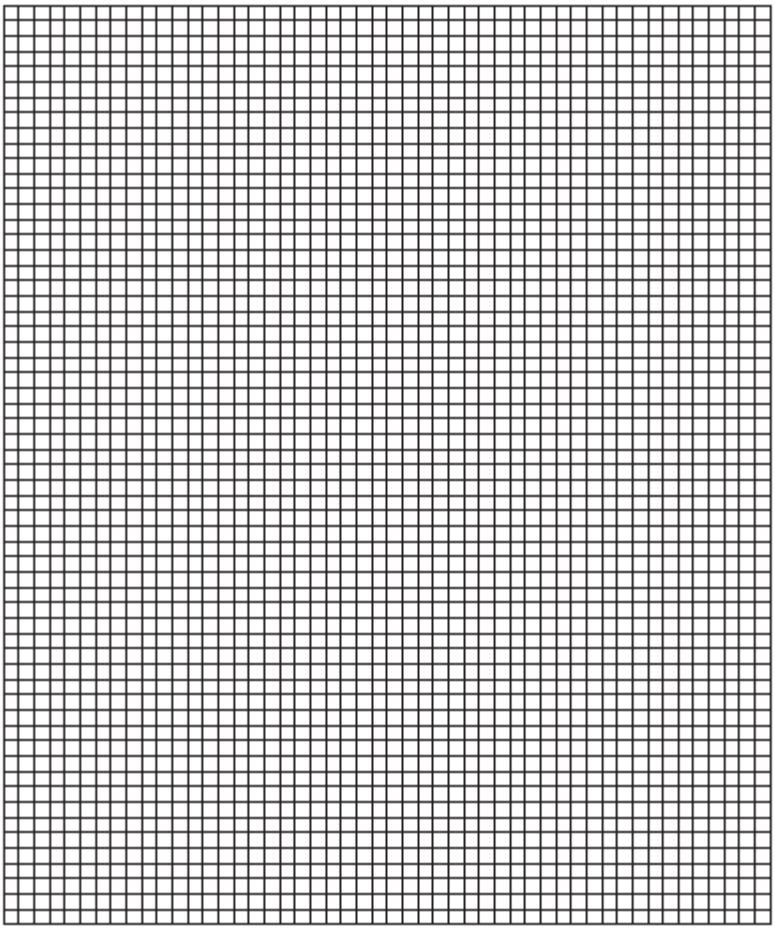
6 Dilute hydrochloric acid was added to excess calcium carbonate in a beaker as shown.



The beaker was placed on a balance and the mass of the beaker and contents recorded every minute.
The results are shown in the table.

mass of beaker and contents/g	184.0	178.0	175.6	174.6	174.0	174.0
time/min	0	1	2	3	4	5

(a) Plot the results on the grid and draw a smooth line graph.



[5]

(b) Use your graph to determine the mass of the beaker and contents after 30 seconds.
Show clearly on your graph how you worked out your answer.

.....

[2]

(c) Why does the mass of the beaker and contents decrease?

.....

[1]

(d) Suggest the purpose of the cotton wool.

.....

[1]

(e) After how long did the reaction finish?

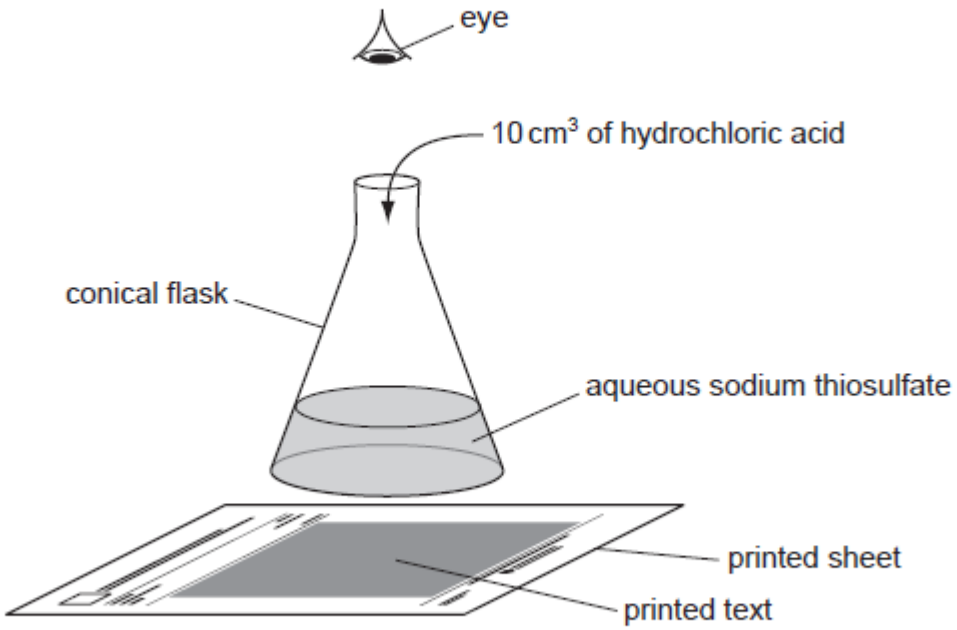
.....

[1]

(f) A second experiment was carried out using hydrochloric acid at a lower temperature.
On the grid sketch a curve to show the expected results for this experiment.
Label this curve **C**.

[2]

4 A student investigated the effect of temperature on the speed of reaction between hydrochloric acid and aqueous sodium thiosulfate. When these chemicals react they form a precipitate, which makes the solution go cloudy. The formation of this precipitate can be used to show how fast the reaction proceeds, using the set up shown below.



Five experiments were carried out.

Experiment 1

By using a measuring cylinder 50 cm^3 of aqueous sodium thiosulfate was poured into a flask. The temperature of the solution was measured. The conical flask was placed on the printed text.
10 cm^3 of hydrochloric acid was added to the flask and the timer started. The time taken for the printed text to disappear from view was recorded in the table. The final temperature of the mixture was measured.

Experiment 2

50 cm^3 of aqueous sodium thiosulfate was poured into a conical flask. The solution was heated until the temperature was about 30 °C. The temperature of the solution was measured.
10 cm^3 of hydrochloric acid was added to the flask and *Experiment 1* was repeated.
The final temperature of the liquid was measured.

Experiment 3

Experiment 2 was repeated but the sodium thiosulfate solution was heated to about 40 °C before adding the hydrochloric acid.
The initial and final temperatures were measured.

Experiment 4

Experiment 2 was repeated but the sodium thiosulfate solution was heated to about 50 °C before adding the hydrochloric acid.
The initial and final temperatures were measured.

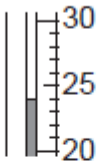
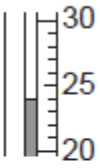
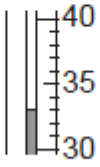
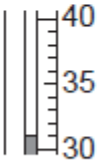
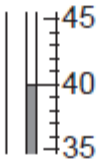
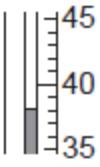
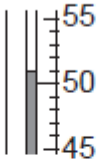
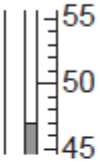
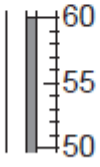
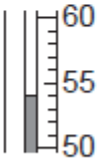
Experiment 5

Experiment 2 was repeated but the sodium thiosulfate solution was heated to about 60 °C before adding the hydrochloric acid.
The initial and final temperatures were measured.

Use the thermometer diagrams to record all of the initial and final temperatures in the table.

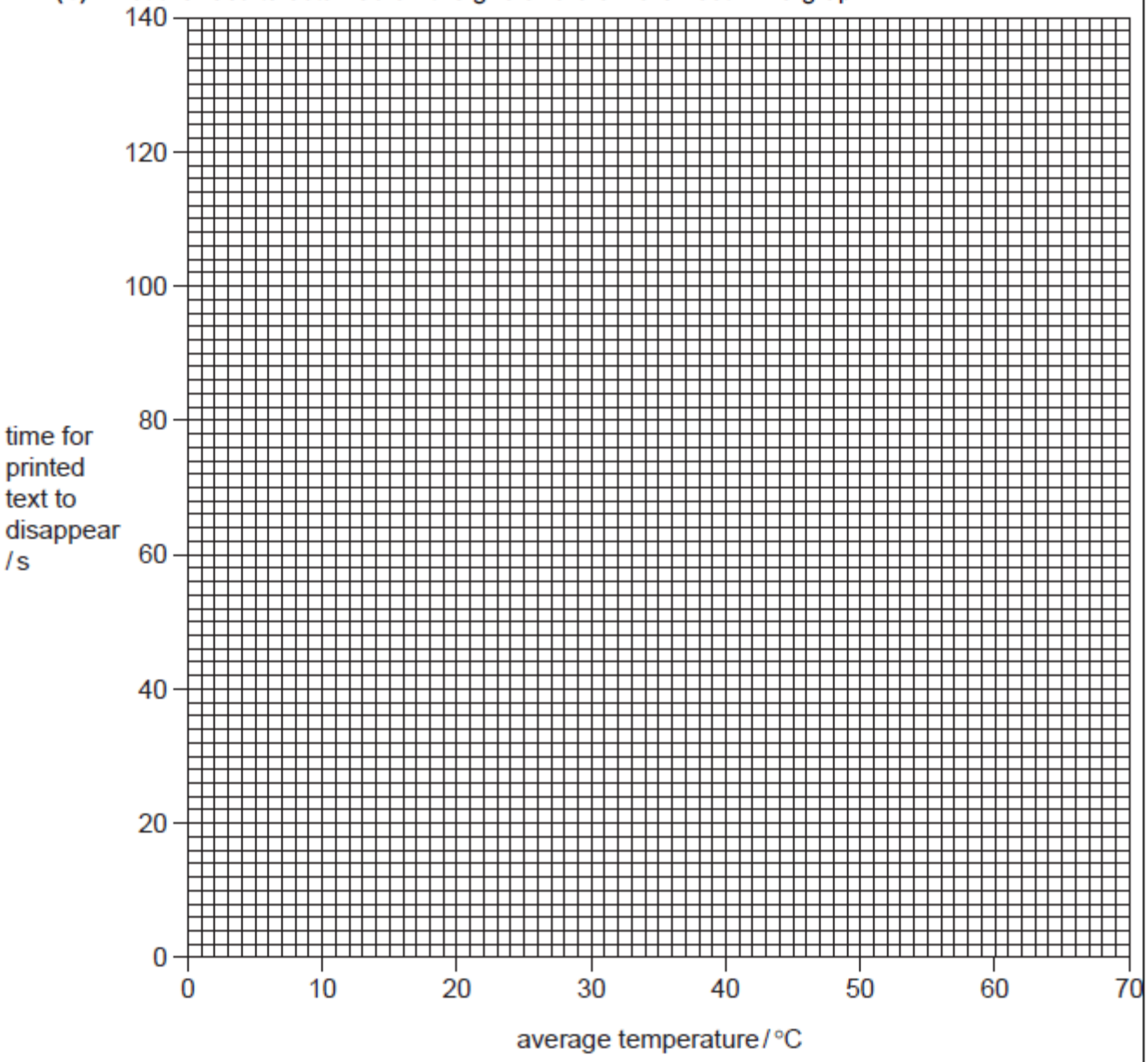
(a) Complete the table of results to show the average temperatures.

Table of results

experiment	thermometer diagram	initial temperature /°C	thermometer diagram	final temperature /°C	average temperature /°C	time for printed text to disappear /s
1						130
2						79
3						55
4						33
5						26

[5]

(b) Plot the results obtained on the grid and draw a smooth line graph.



[4]

(c) **(i)** In which experiment was the speed of reaction greatest?

.....

[1]

(ii) Explain why the speed was greatest in this experiment.

.....

.....

.....

[3]

(d) Why was the same volume of sodium thiosulfate solution and the same volume of hydrochloric acid used in each experiment?

.....

..... [1]

(e) (i) From your graph, deduce the time for the printed text to disappear if *Experiment* 2 was to be repeated at 70°C.

Show clearly on the grid how you worked out your answer.

..... [3]

(ii) Sketch on the grid the curve you would expect if all the experiments were repeated using 50 cm^3 of more concentrated sodium thiosulfate solution. [1]

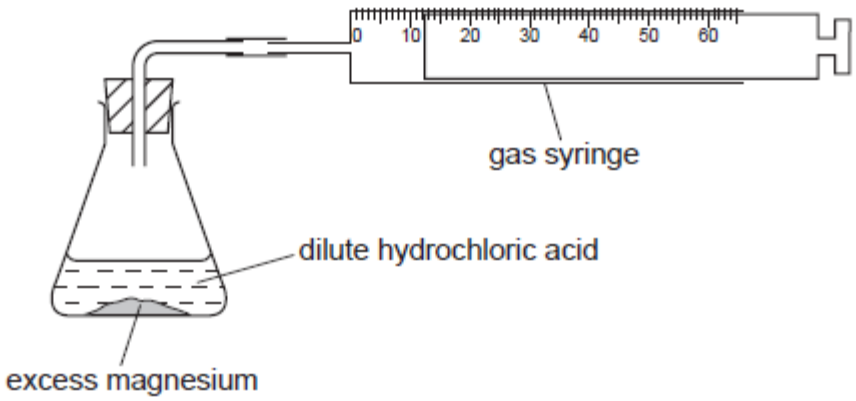
(f) Explain **one** change that could be made to the experimental **method** to obtain more accurate results.

change .....

explanation ..... [2]

Q# 16/ iGCSE Chem/2008s/Paper 6/

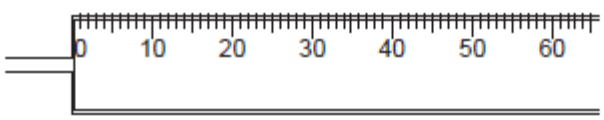
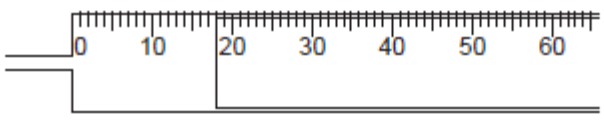
6 The speed of reaction between excess magnesium and dilute hydrochloric acid was investigated using the apparatus below.

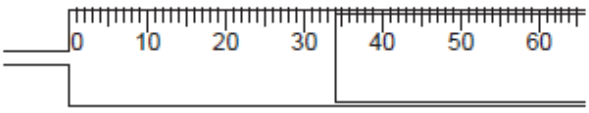
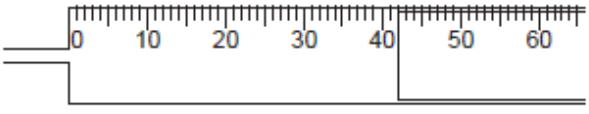
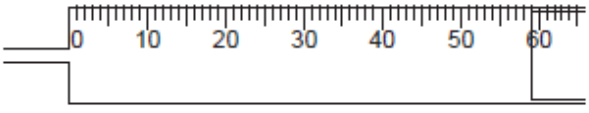
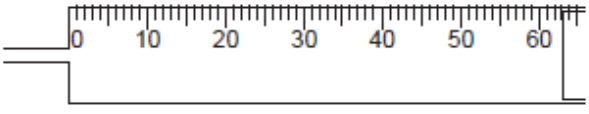
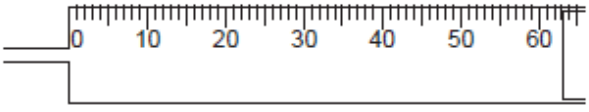


The volume of hydrogen produced was measured every minute for six minutes.

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

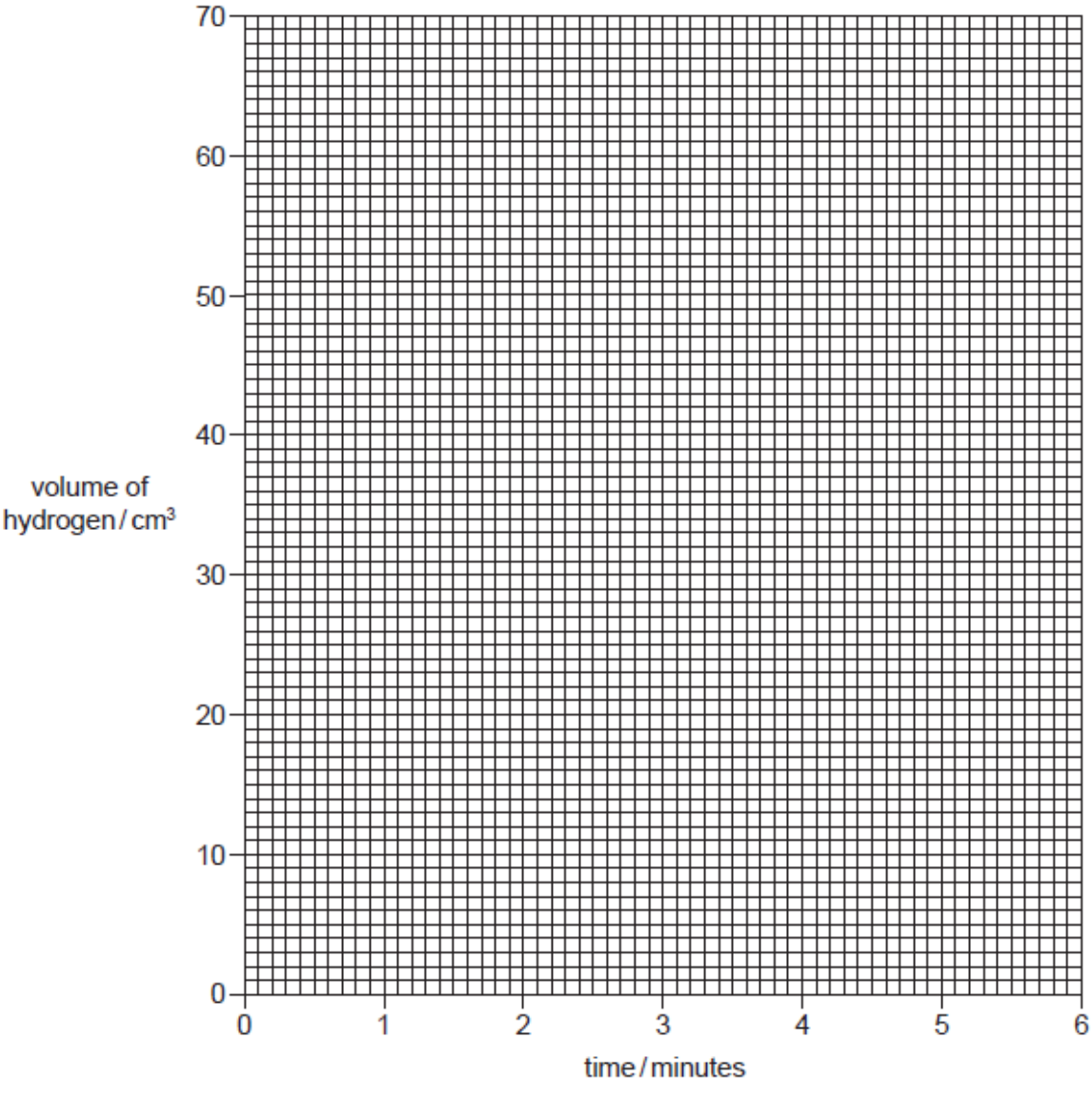
Table of results

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.

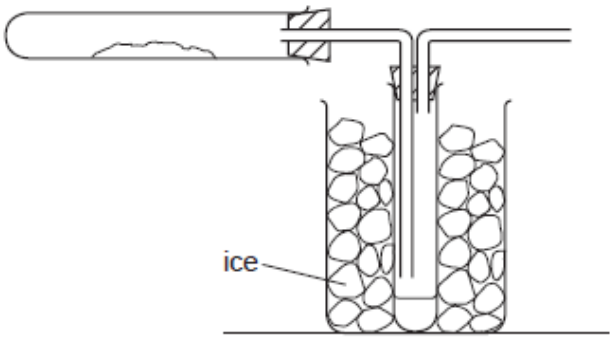
.....

..... [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]

Q# 17/ iGCSE Chem/2007/w/Paper 6/

1 Hydrated copper sulphate crystals, $CuSO_4.5H_2O$ were heated in the apparatus shown below.



(a) Indicate on the diagram using arrows

(i) where the copper sulphate crystals are placed,

(ii) where heat is applied. [2]

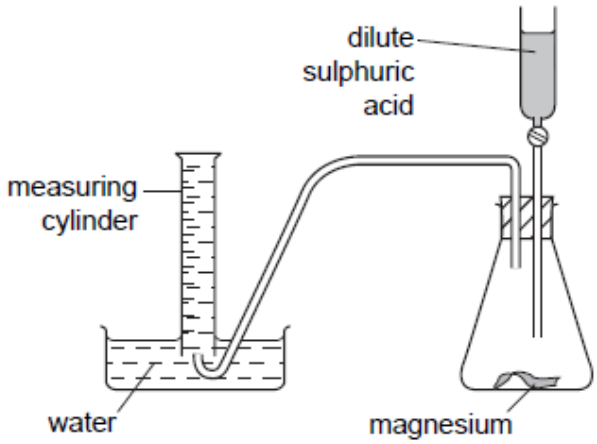
(b) What is the purpose of the ice?

..... [1]

(c) The crystals changed colour from ..... to ..... [2]

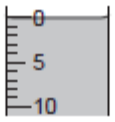
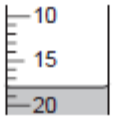
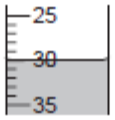
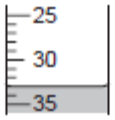
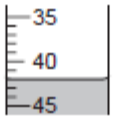
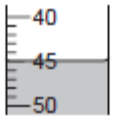
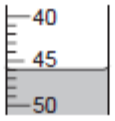
Q# 18/ iGCSE Chem/2007/w/Paper 6/

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



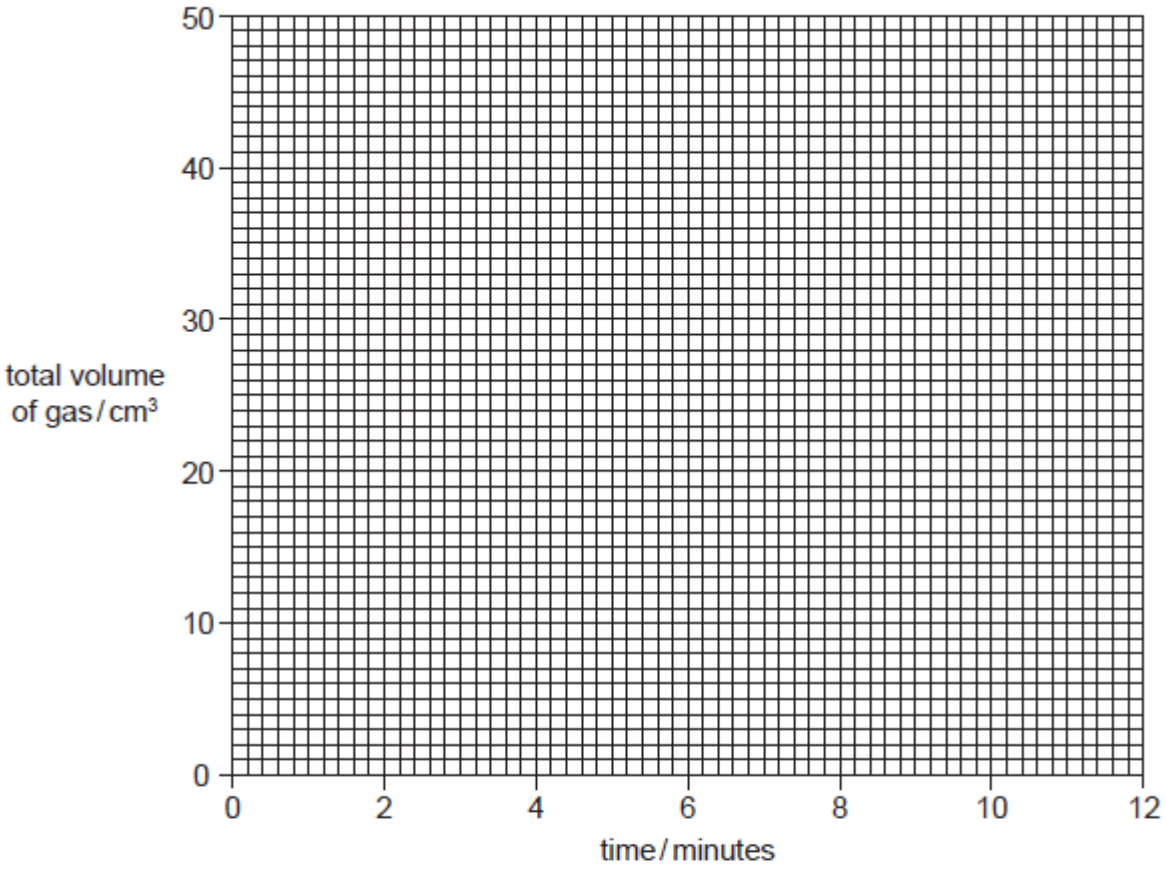
In an experiment 50 cm^3 of dilute sulphuric acid was added to a large piece of magnesium. A student measured the total volume of gas produced at 2 minute intervals.

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]

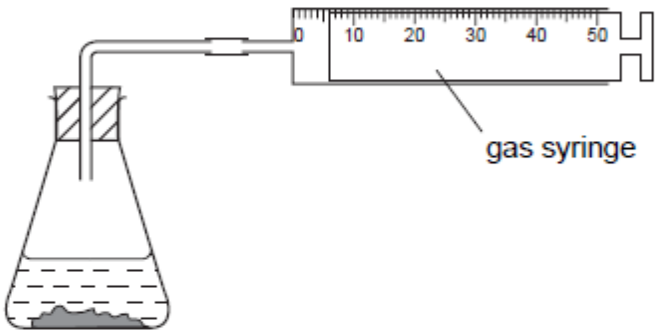
(ii) Use the graph to deduce what the correct volume should be at this time.

..... [1]

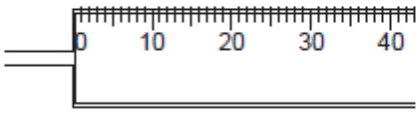
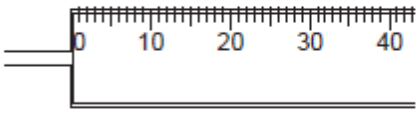
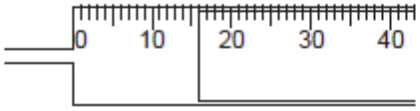
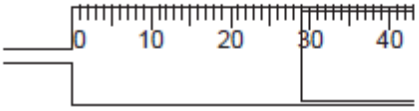
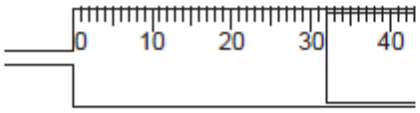
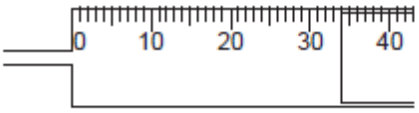
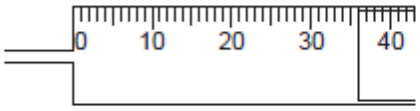
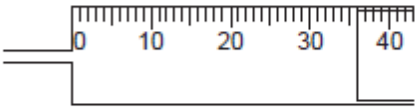
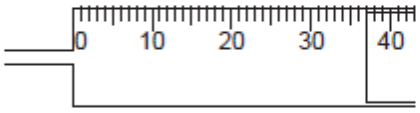
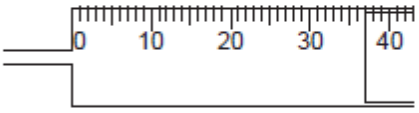
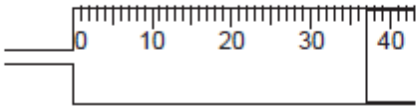
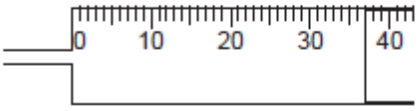
Q# 19/ iGCSE Chem/2007s/Paper 6/

6 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.

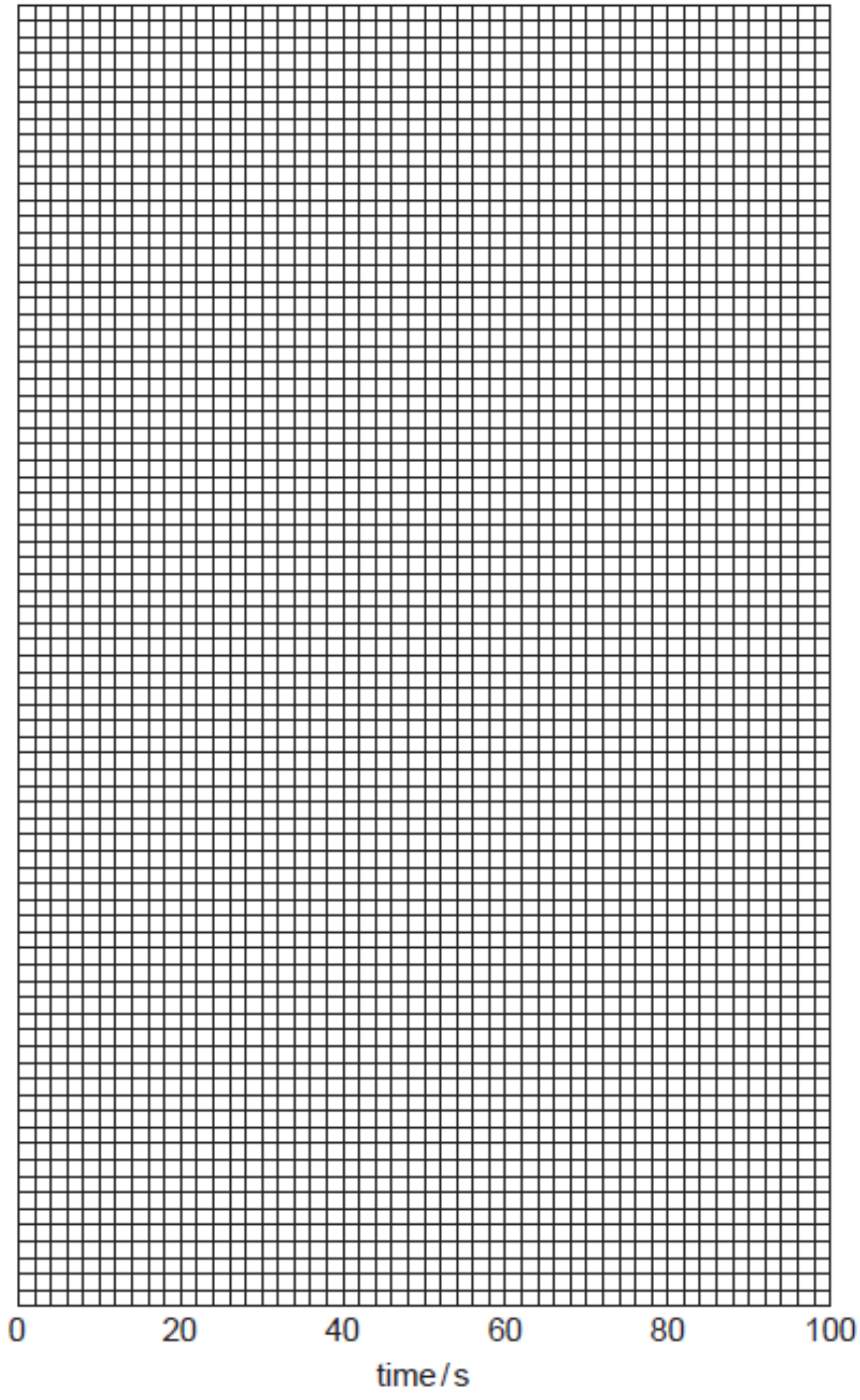
time / s	using catalyst **W**	using catalyst **X**
0		
20		
40		
60		
80		
100		

(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]

Q# 20/ iGCSE Chem/2007s/Paper 6/

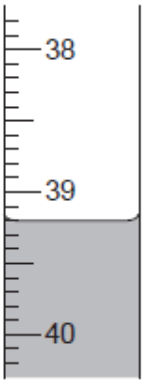
4 A student investigated the reaction between sodium thiosulphate and potassium iodate.

Two experiments were carried out.

Experiment 1

A burette was filled up to the 0.0 cm^3 mark with sodium thiosulphate solution. By using a measuring cylinder, 20 cm^3 of solution **A** of potassium iodate was placed into a conical flask. Dilute sulphuric acid and potassium iodide were also added to the flask. The flask was shaken to mix the contents and produce a red solution of iodine.

The sodium thiosulphate solution was added to the flask. When the contents of the flask were yellow, 1 cm^3 of starch solution was added to the flask. Addition of sodium thiosulphate to the flask was continued until the solution turned colourless. Use the burette diagram to record the final volume in the table and complete the column in the table of results on page 6.



Experiment 2

Experiment 1 was repeated using a different solution of potassium iodate, solution **B**. Use the burette diagrams to record the volumes and complete the table on page 6.

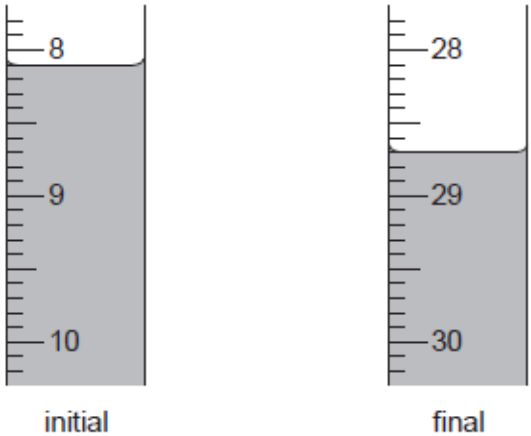


Table of results

Burette readings / cm^3

	Experiment 1	Experiment 2
final reading		
initial reading	0.0	8.1
difference		

[4]

(a) Suggest why the starch was used.

..... [1]

(b) **(i)** In which experiment was the greatest volume of sodium thiosulphate solution used?

..... [1]

(ii) Compare the volumes of sodium thiosulphate solution used in Experiments 1 and 2.

..... [1]

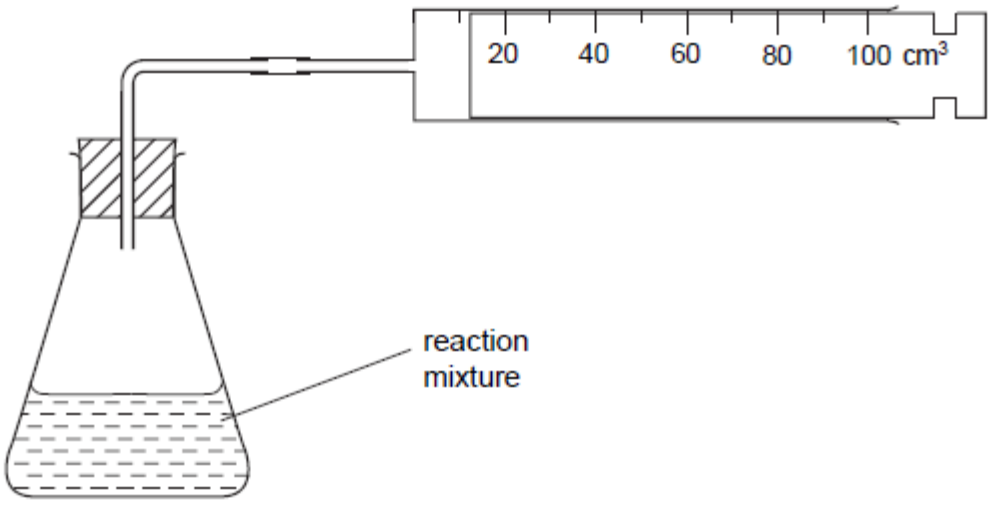
(iii) Suggest an explanation for the difference in the volumes.

.....

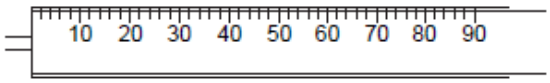
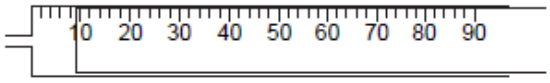
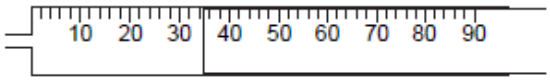
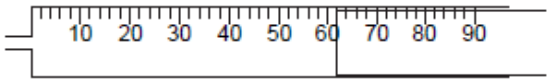
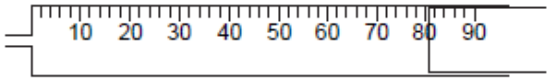
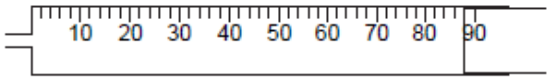
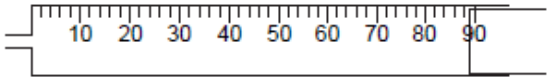
..... [2]

Q# 21/ iGCSE Chem/2006/w/Paper 6/

3 An investigation into the reaction of calcium with water was carried out using the apparatus below. The temperature of the water increased during the experiment.

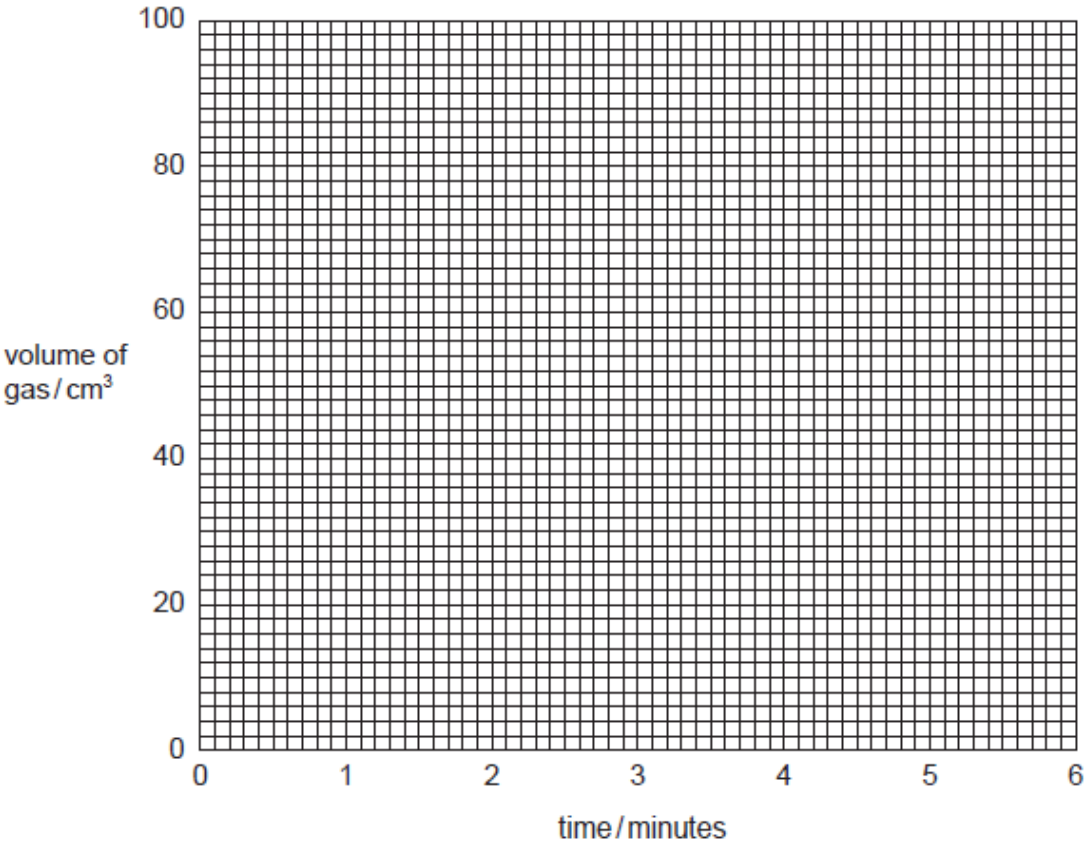


The volume of hydrogen collected at one minute intervals was measured. Use the diagrams to record the volumes in the table.

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

[2]

(a) Plot the results on the grid. Join **all** of the results with a smooth curve.



[3]

(b) What type of chemical reaction occurs when calcium reacts with cold water?

..... [1]

(c) (i) Use the graph to describe how the speed of this reaction changes during the six minutes.

.....

..... [2]

(ii) Explain possible reasons for the changes in **(c)(i)**.

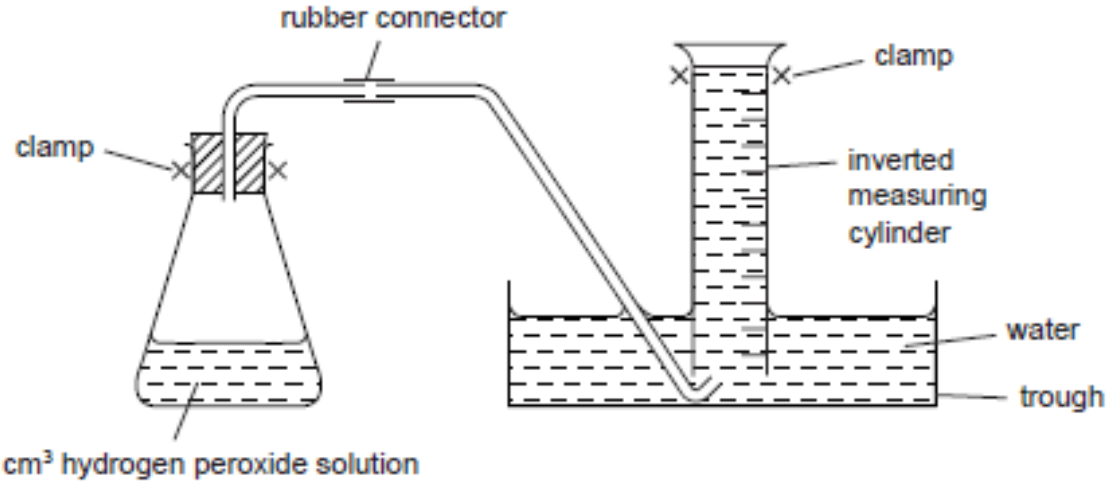
.....

.....

..... [2]

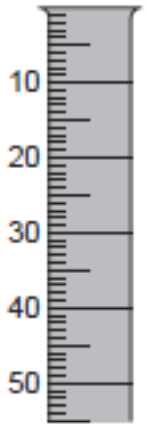
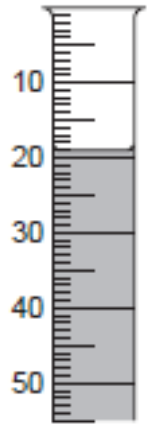
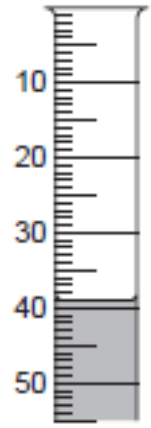
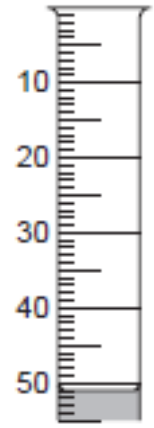
Q# 22/ iGCSE Chem/2006s/Paper 6/

4 A student investigates the speed of reaction when aqueous hydrogen peroxide breaks down using a catalyst, manganese(IV) oxide. The catalyst remains unchanged at the end of the reaction.
The apparatus was set up as shown in the diagram.



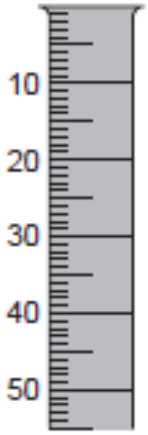
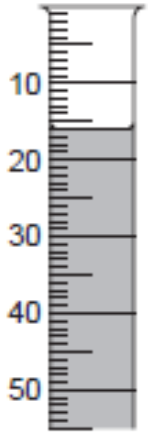
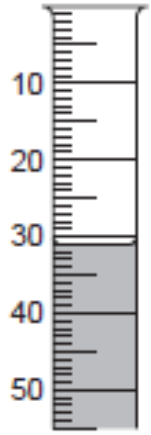
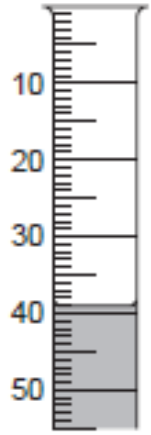
Experiment 1

By using a measuring cylinder, 20 cm^3 of hydrogen peroxide solution was poured into a conical flask. One spatula measure of manganese(IV) oxide was added to the flask, the bung was quickly put in the flask and the timer started.
The volume of gas collected in the measuring cylinder at 10 seconds, 20 seconds and 30 seconds was measured.
The results are shown in the table below.

time / s	0	10	20	30
measuring cylinder diagram				
volume of gas in measuring cylinder / cm^3	0	19	39	51

Experiment 2

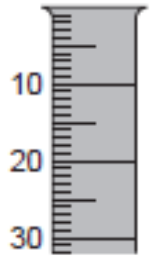
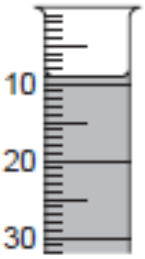
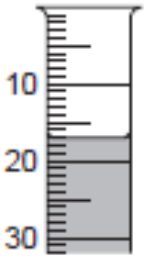
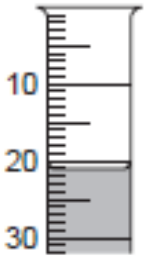
By using a measuring cylinder 15 cm^3 of hydrogen peroxide was poured into the conical flask. The instructions were repeated exactly as given for Experiment 1, but 5 cm^3 of distilled water was also added to the flask.
Use the diagrams to record your results in the table below.

time / s	0	10	20	30
measuring cylinder diagram				
volume of gas in measuring cylinder / cm^3				

[2]

Experiment 3

Experiment 1 was repeated using 10 cm^3 of hydrogen peroxide and 10 cm^3 of distilled water. Record your results in the table.

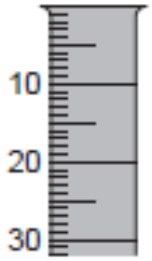
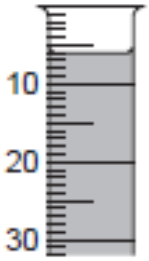
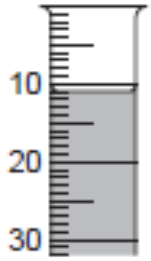
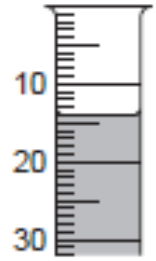
time / s	0	10	20	30
measuring cylinder diagram				
volume of gas in measuring cylinder / cm^3				

[2]

Experiment 4

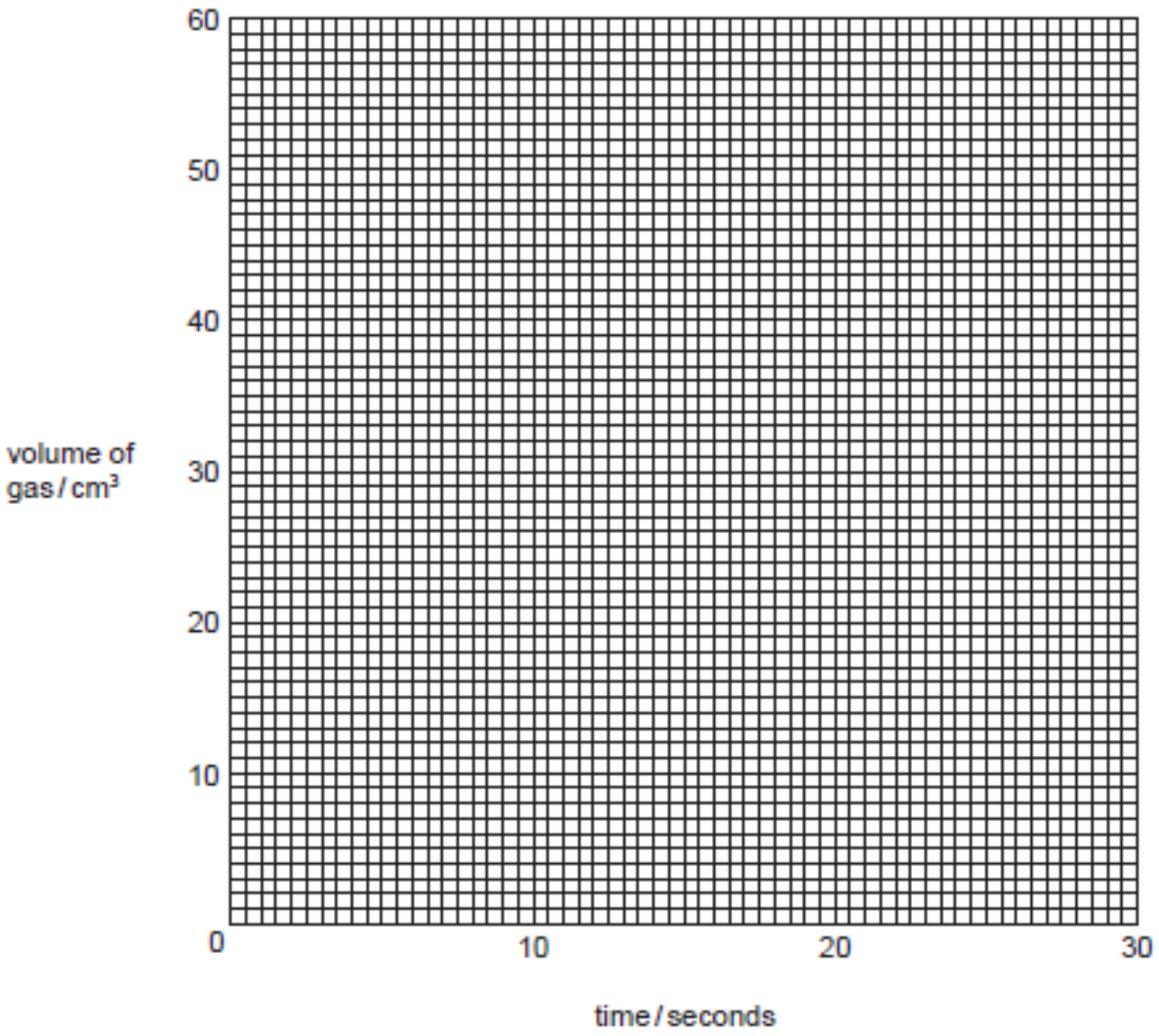
Experiment 1 was repeated using 5 cm^3 of hydrogen peroxide and 15 cm^3 of distilled water.

Record your results in the table.

time / s	0	10	20	30
measuring cylinder diagram				
volume of gas in measuring cylinder / cm^3				

[2]

(a) Plot your results on the grid for each Experiment. Draw 4 graphs and label each clearly with the number of the Experiment.



[5]

(b) (i) Which Experiment has the fastest rate of reaction?

..... [1]

(ii) Explain, in terms of particles, why this Experiment has the fastest rate.

.....

.....

..... [2]

(c) (i) State two sources of error in the Experiments.

1 .....

.....

2 .....

..... [2]

(ii) Suggest two improvements to reduce the sources of error in the Experiments.

1 .....

.....

2 .....

..... [2]

(d) State a practical method you could use to prove that manganese(IV) oxide was a catalyst in Experiment 1.

.....

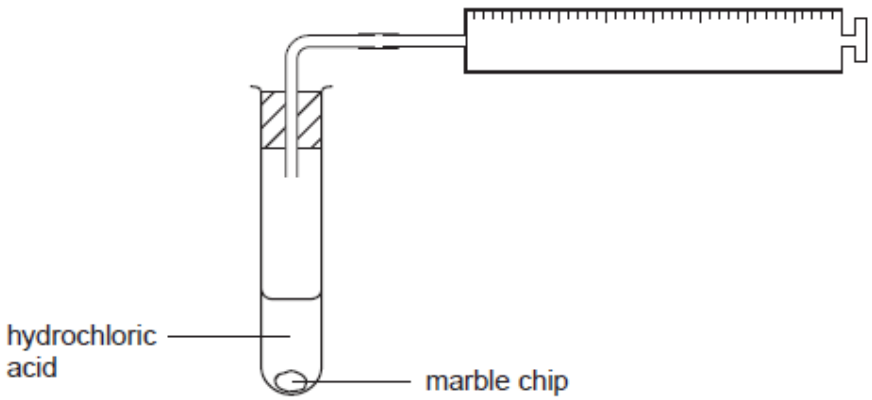
.....

..... [2]

Q# 23/ iGCSE Chem/2005/w/Paper 6/

4 A student investigated the speed of reaction between aqueous hydrochloric acid and marble chips (calcium carbonate).

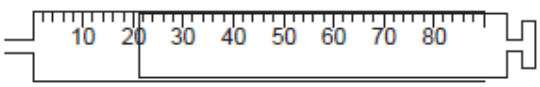
The apparatus below was used.



5 test-tubes were put in a rack. To each test-tube was added 10 cm^3 of different solutions of aqueous hydrochloric acid and a marble chip. The marble chips were the same size.

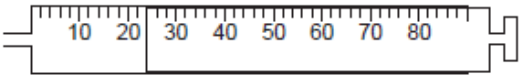
Experiment 1

By using a measuring cylinder 10 cm^3 of the solution **P** of aqueous hydrochloric acid was placed in the first test-tube. A marble chip was added and the volume of gas collected after two minutes was measured. Use the gas syringe diagram to record the volume.



Experiment 2

Experiment 1 was repeated using the solution **Q** of aqueous hydrochloric acid. Use the diagram to record the volume of gas collected in the table.

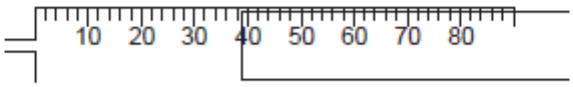


Experiments 3, 4 and 5

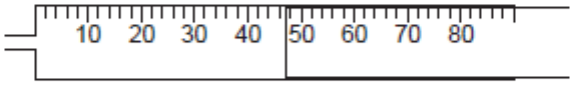
Experiment 1 was repeated using the solutions **R**, **S** and **T** of aqueous hydrochloric acid in the third, fourth and fifth test-tubes.

Use the diagrams to record the volumes in the table.

Experiment 3



Experiment 4



Experiment 5

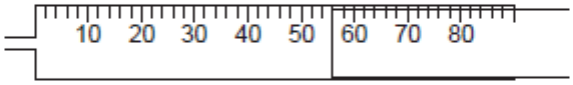
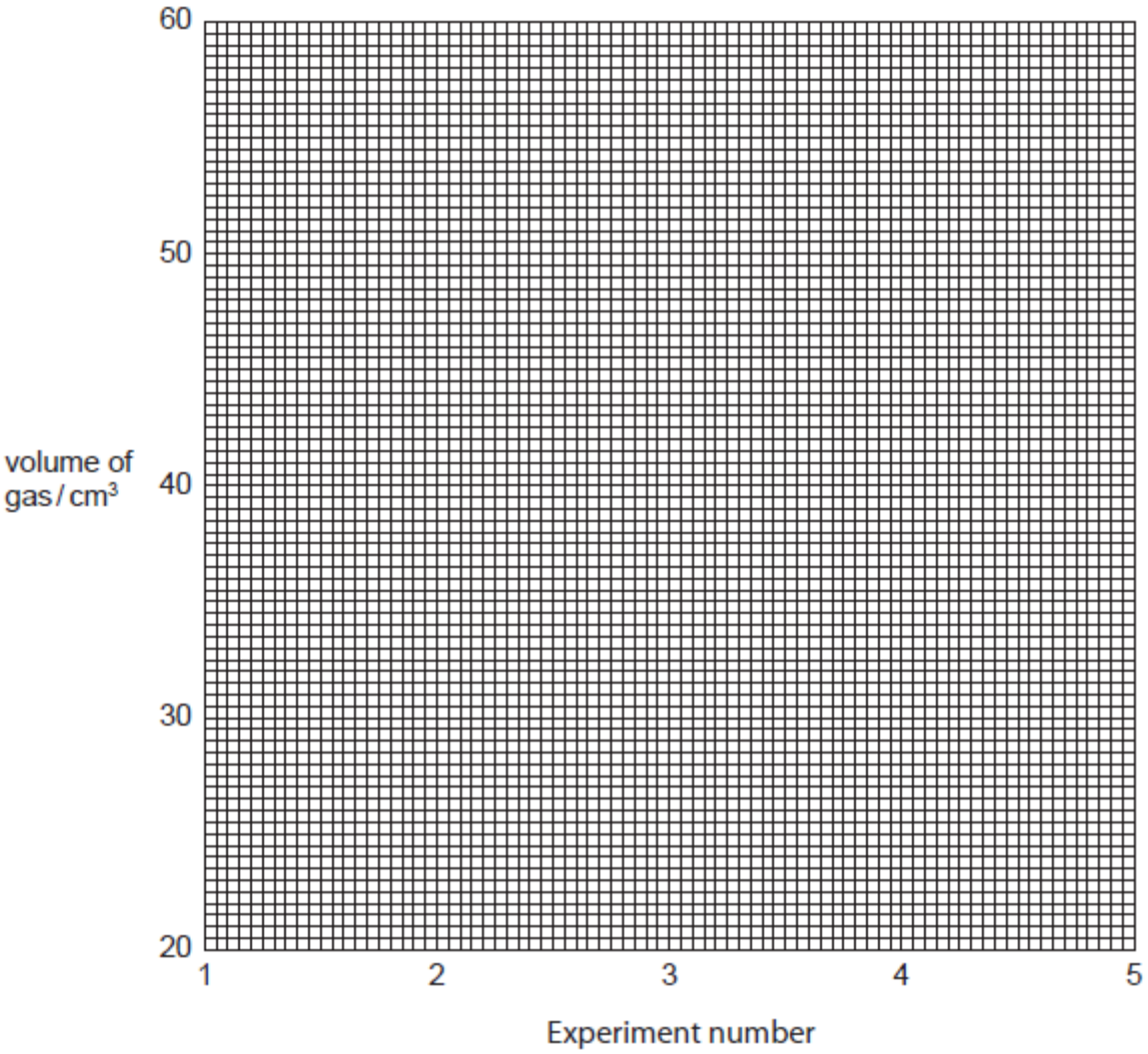


Table of results

Experiment	solution of hydrochloric acid	volume of gas collected / cm^3
1	**P**	
2	**Q**	
3	**R**	
4	**S**	
5	**T**	

[3]

(a) Plot your results on the grid. Draw a straight line graph.



[4]

(b) Which result appears inaccurate? Give a reason for your choice.

Experiment .....

reason ..... [2]

(c) **(i)** Which Experiment had the fastest rate of reaction?

..... [1]

(ii) Suggest why this Experiment was the fastest.

.....

.....

..... [2]

(d) How would the student know which of the reactants in the Experiment was in *excess*?

.....

..... [2]

(e) **(i)** State **one** possible source of error in the Experiments.

.....

..... [1]

(ii) Suggest **one** improvement to reduce this source of error in the Experiments.

.....

..... [1]

Q# 24/ iGCSE Chem/2005s/Paper 6/

8 An aqueous solution of hydrogen peroxide decomposes very slowly to form oxygen. The speed of decomposition can be increased by using a catalyst. Two possible catalysts are the solids copper(II) oxide and chromium(III) oxide.

Plan an investigation to find out which of these two oxides is the better catalyst for this decomposition.

The space below can be used for a diagram.

.....

.....

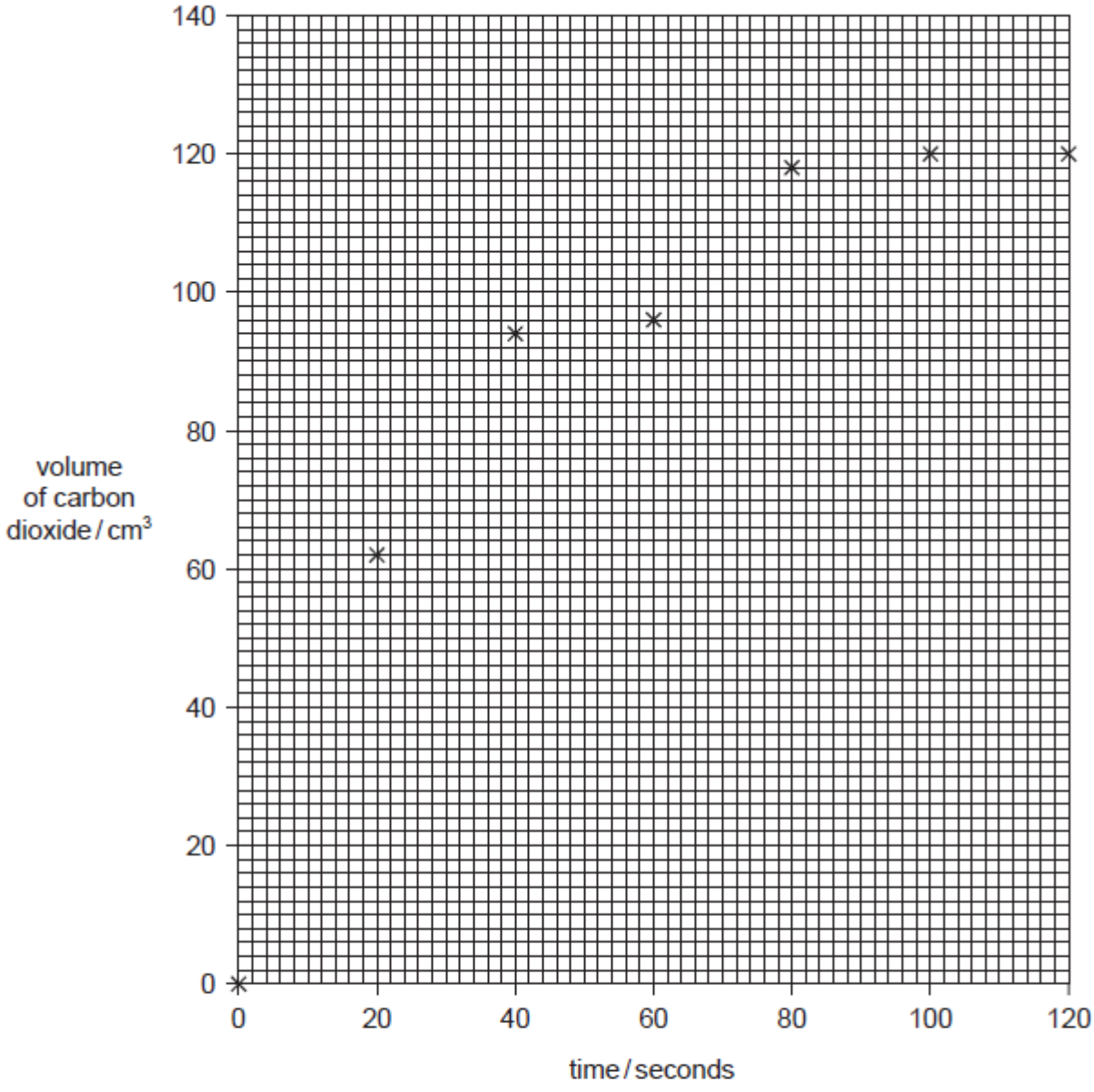
.....

.....

.....

..... [6]

2 The addition of calcium carbonate to excess dilute nitric acid produces carbon dioxide. The volume of carbon dioxide given off at 20 second intervals was recorded and plotted on the grid.



(a) Draw a smooth line graph on the grid. [1]

(b) Circle the result which appears to be incorrect? Why have you selected this result?

.....

.....

..... [2]

(c) Why does the reaction slow down?

..... [1]

Q# 26/ iGCSE Chem/2004s/Paper 6/

7 Describe a chemical test to **distinguish** between each of the following pairs of substances. An example is given.

potassium chloride and potassium iodide

test: add aqueous lead(II) nitrate

result: potassium chloride gives a white precipitate, potassium iodide gives a yellow precipitate

(a) water and ethanol

test .....

result with water .....

result with ethanol ..... [2]

Q# 27/ iGCSE Chem/2004s/Paper 6/

8 **Is manganese(IV) oxide a catalyst?**

A catalyst is a substance that speeds up a chemical reaction and remains unchanged.

Hydrogen peroxide, H_2O_2 breaks down to form oxygen. This reaction is very slow without a catalyst. Describe an experiment to show that manganese(IV) oxide is a catalyst for this reaction.

You are provided with the following items.

Hydrogen peroxide solution

Manganese(IV) oxide

Measuring cylinder

Balance

Beaker

Filtration apparatus

Splints/Bunsen burner

Distilled water

.....

.....

.....

.....

.....

..... [6]

3 A student investigated the speed of reaction between aqueous potassium bromate and potassium iodide solution.

A burette was filled up to the 0.0 cm^3 mark with aqueous potassium iodide.

To each of 5 test-tubes was added 6 cm^3 of aqueous potassium iodide to be used in the 5 following experiments.

Experiment 1

By using a measuring cylinder 12 cm^3 of aqueous potassium bromate was poured into a small beaker. To this solution was added 4 cm^3 of water, 2 cm^3 of hydrochloric acid, 5 cm^3 of starch solution and 1 cm^3 of sodium thiosulphate solution.

The beaker was placed on a cross drawn on a piece of paper.

From one of the test-tubes 6 cm^3 of aqueous potassium iodide was added to the mixture in the beaker and the timer started. A dark blue colour formed. The timer was stopped when the cross on the paper could not be seen.

Use the stop clock diagram to record the time in the table.

Experiment 2

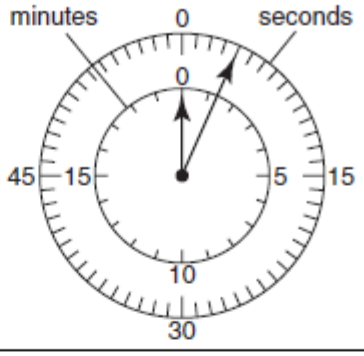
By using a measuring cylinder 10 cm^3 of potassium bromate solution was poured into a beaker. The instructions were repeated exactly as given for Experiment 1, but 6 cm^3 of water was added to the beaker.

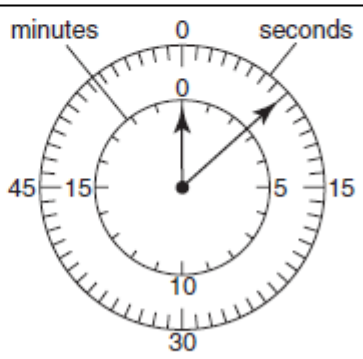
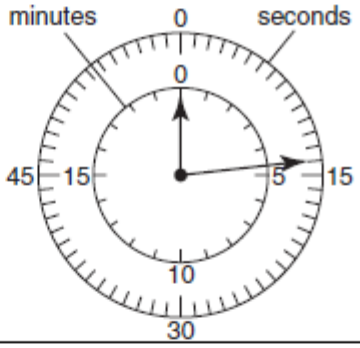
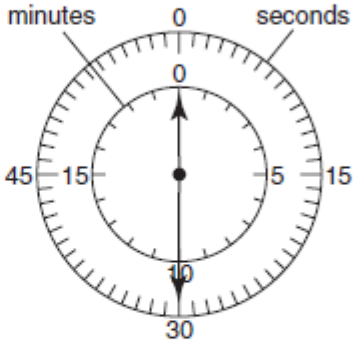
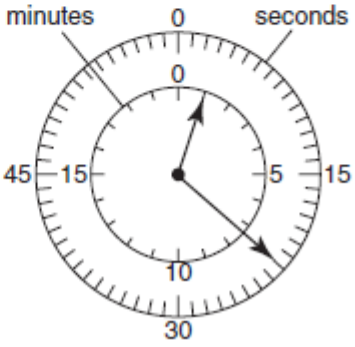
Use the diagram to record the time in the table.

Experiments 3, 4 and 5

Experiment 1 was repeated using the volumes of aqueous potassium bromate and water specified in the table of results. Record the times in the table.

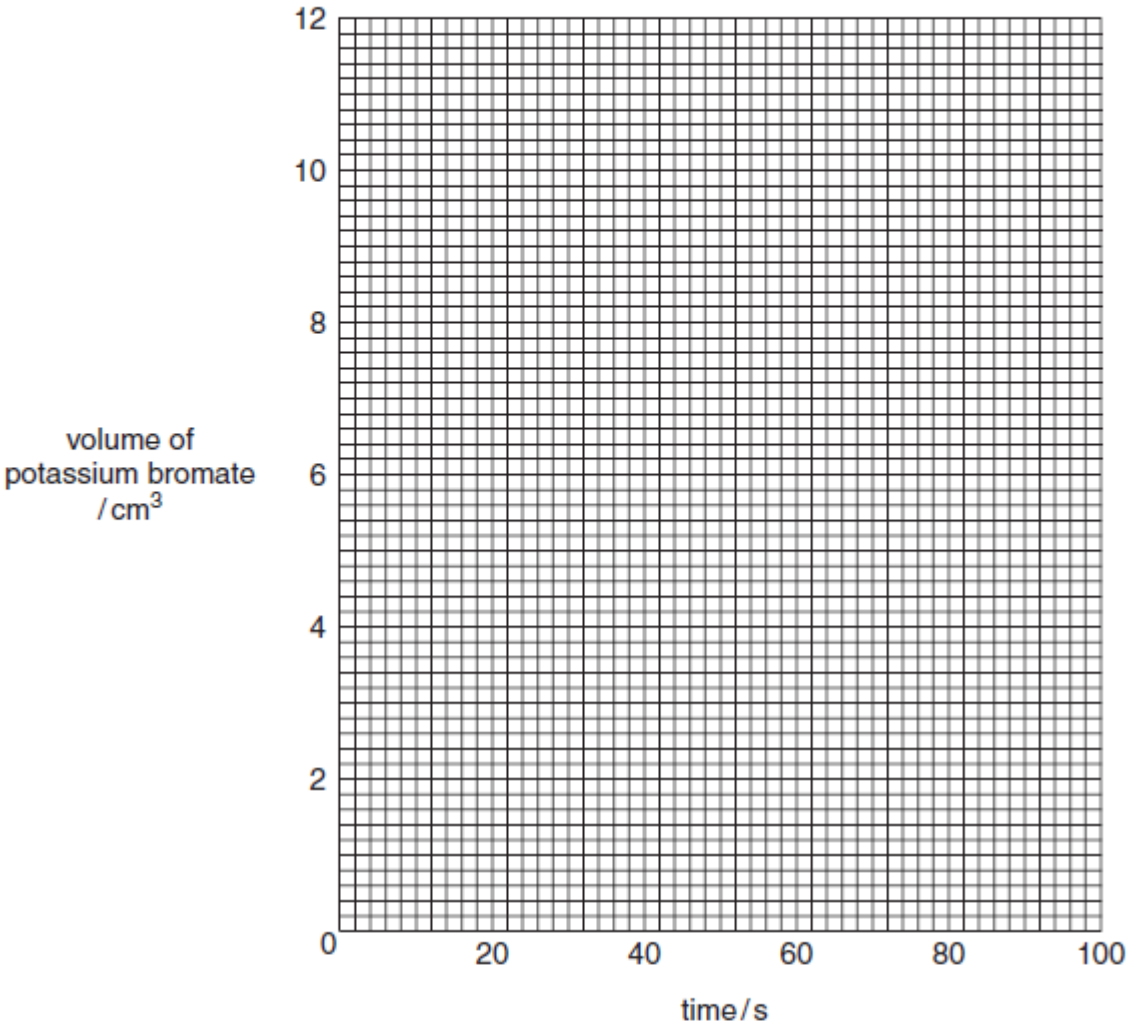
Table of results

Experiment	volume		clock diagram	time/s
	potassium bromate/cm^3	water/cm^3		
1	12	4		

2	10	6		
3	8	8		
4	6	10		
5	4	12		

[5]

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



[4]

(b) From your graph estimate the time of the reaction if Experiment 1 was repeated using 5 cm^3 of potassium bromate and 11 cm^3 of water.

.....

Show clearly on your graph how you worked out your answers. [3]

(c) **(i)** Which experiment is the quickest?

.....

(ii) Explain why this experiment is the quickest.

.....

.....

.....[3]

(d) (i) State **two** possible sources of error in the experiments.

1 .....

.....

2 .....

.....

(ii) Suggest **two** improvements to reduce the sources of error in the experiments.

1 .....

.....

2 .....

.....[4]

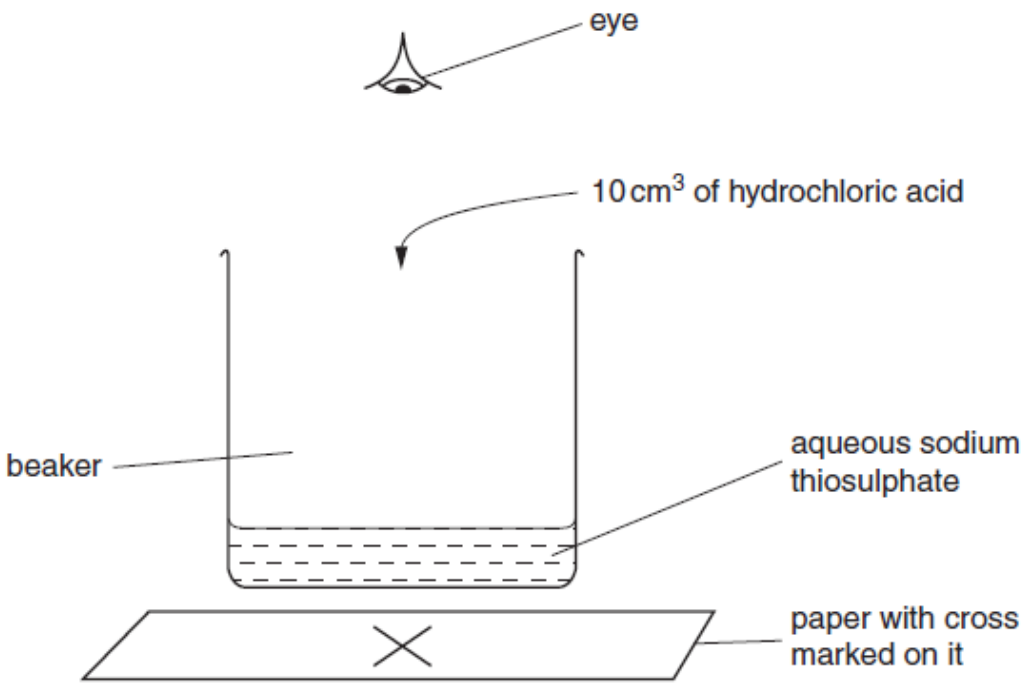
Q# 29/ iGCSE Chem/2003s/Paper 6/

2 A student carried out an experiment to investigate the speed of the reaction between sodium thiosulphate and dilute hydrochloric acid.

$$Na_2S_2O_3 + 2HCl \longrightarrow 2NaCl + S + H_2O + SO_2$$

Experiment 1

By using a measuring cylinder, 50 cm^3 of sodium thiosulphate solution was poured into a 100 cm^3 beaker. The beaker was placed on a cross drawn on a piece of paper. 10 cm^3 of hydrochloric acid was added to the beaker and the timer started.



The time was taken until the cross could not be seen. The time was recorded in the table.

Experiments 2, 3, 4 and 5

Experiment 1 was repeated using different volumes of sodium thiosulphate as shown in the table. All experiments were carried out at 25 °C.

Table of results

Experiment	volume of sodium thiosulphate/cm^3	volume of water/cm^3	time for cross to disappear/s
1	50	0	45
2	40	10	60
3	30	20	80
4	20	30	130
5	10	40	255

(a) Why does the cross on the paper disappear?

.....

.....[2]

(b) Why was the total volume of solution kept constant?

.....

.....[1]

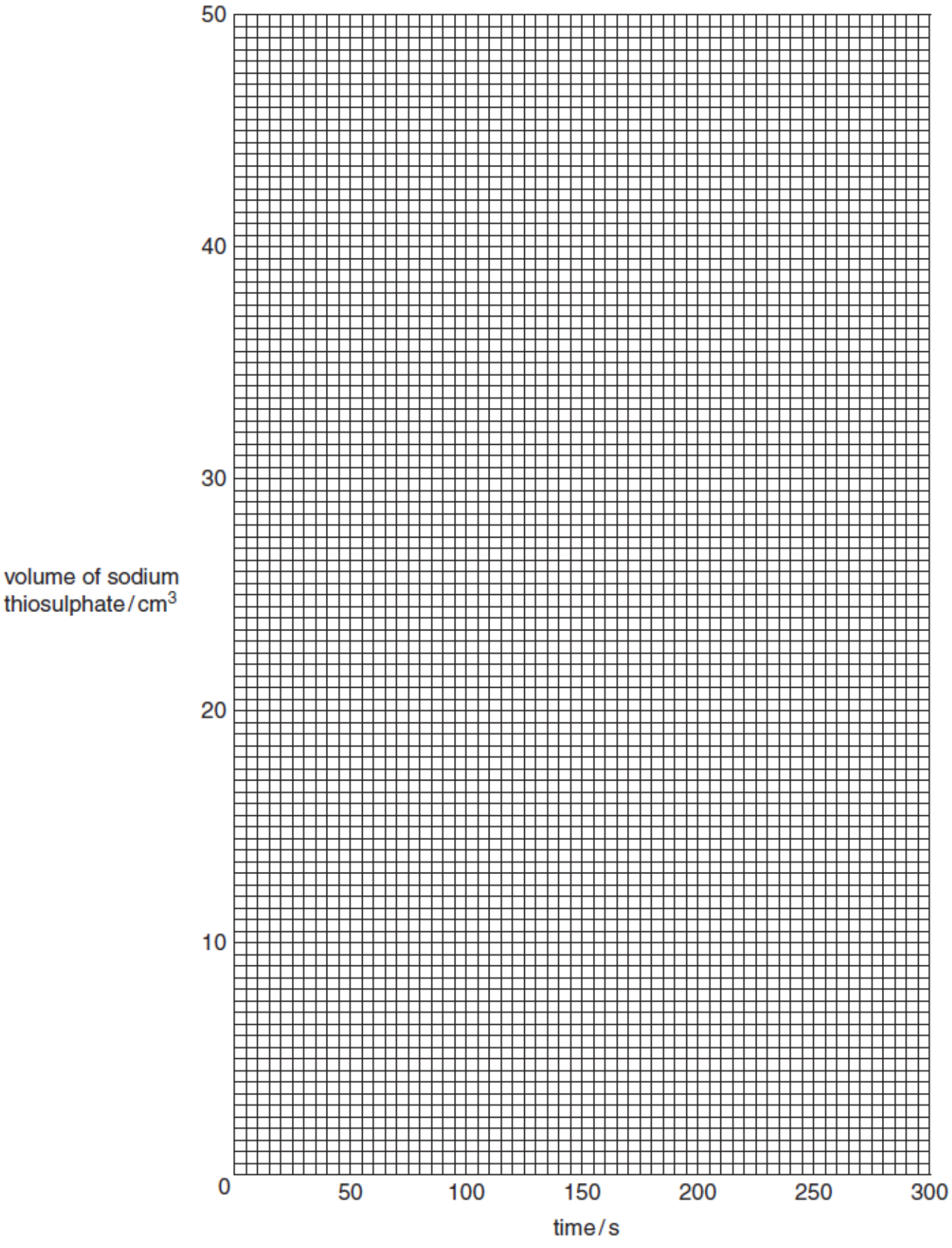
(c) In which order should the water, hydrochloric acid and sodium thiosulphate solution be added to the beaker?

first .....

second .....

last .....[1]

(d) (i) Plot the results on the grid below. Draw a smooth line graph and label it 25 °C. [5]



(ii) Sketch on the grid the graph you would expect if the experiments were repeated at 50 °C. Label this graph. [2]

(e) The experiments were repeated using a 250 cm^3 beaker instead of a 100 cm^3 beaker. Suggest how the results would differ. Explain your answer.

.....

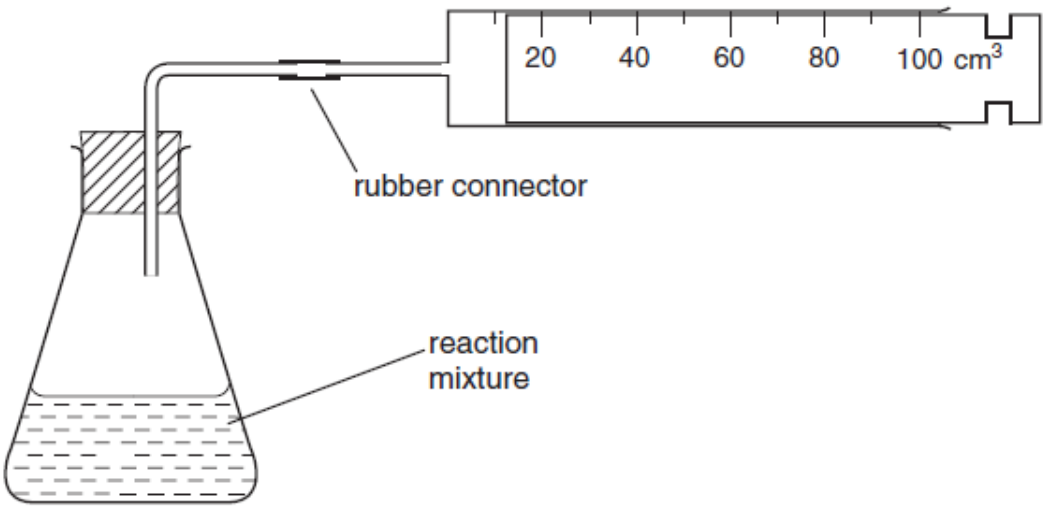
.....

.....

.....[2]

Q# 30/ iGCSE Chem/2003s/Paper 6/

5 An experiment was carried out using the apparatus below.



By using a measuring cylinder, 20 cm^3 of hydrogen peroxide was placed in the flask and 0.8 g of the catalyst, manganese(IV) oxide was added. The bung was replaced and the gas collected was measured at 1 minute intervals. The results were plotted on the grid (opposite).

(a) **(i)** Draw a smooth line graph on the grid. [1]

(ii) Which result appears to be inaccurate? Why have you chosen this result?

.....

.....[2]

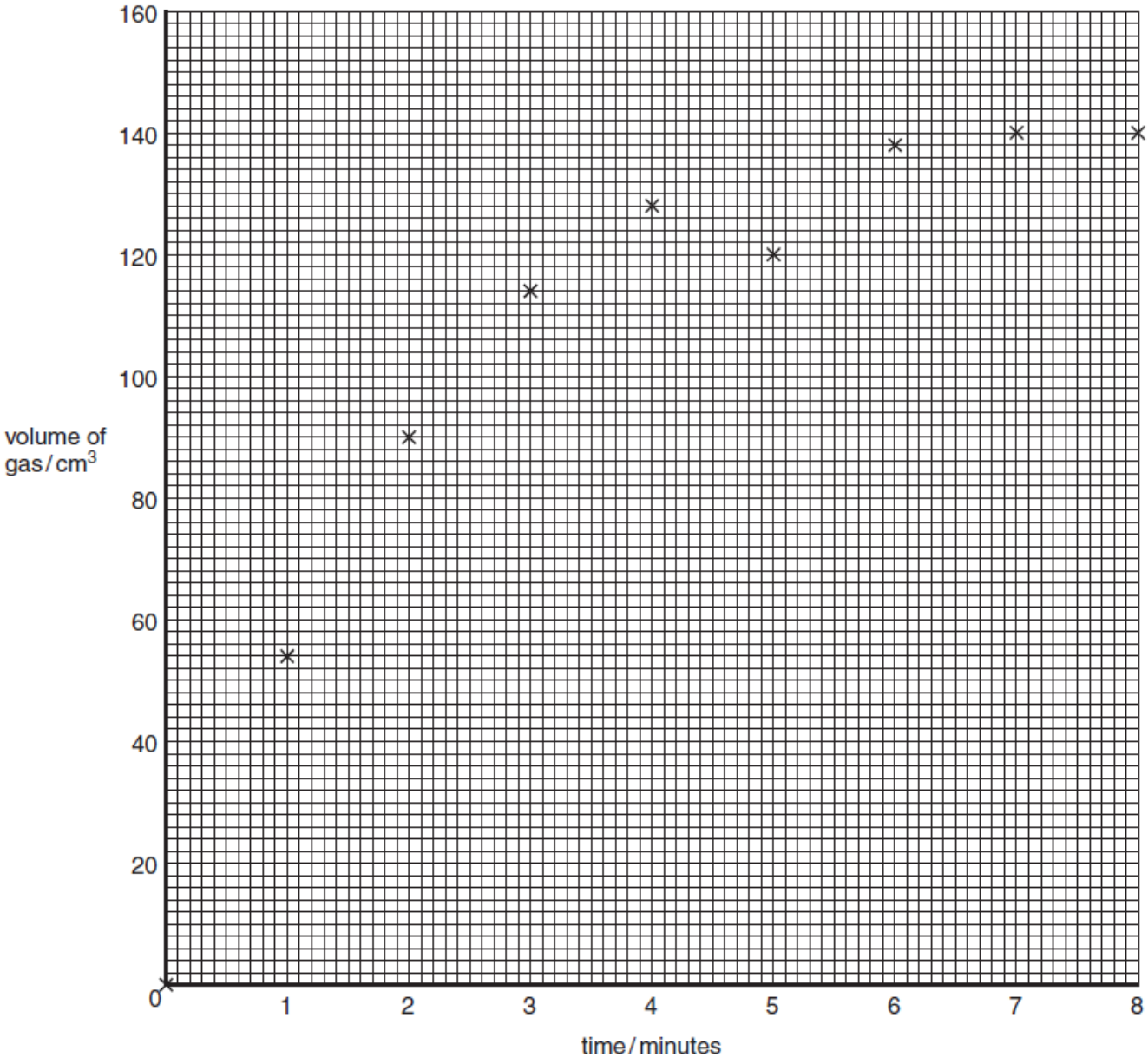
(b) What mass of manganese(IV) oxide would remain at the end of the experiment?

.....[1]

(c) What would be the effect of using a rubber connector with a hole in it?

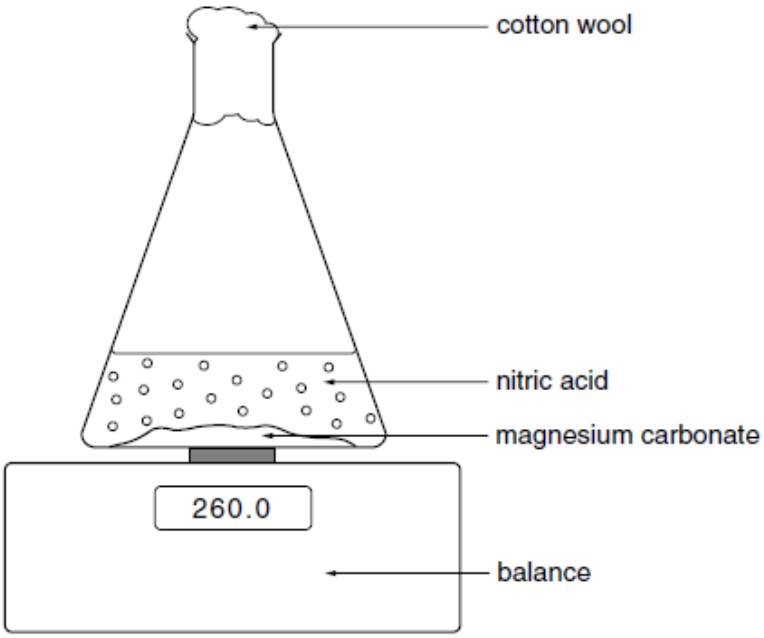
.....

.....[2]



Q# 31/ iGCSE Chem/2002/w/Paper 6/

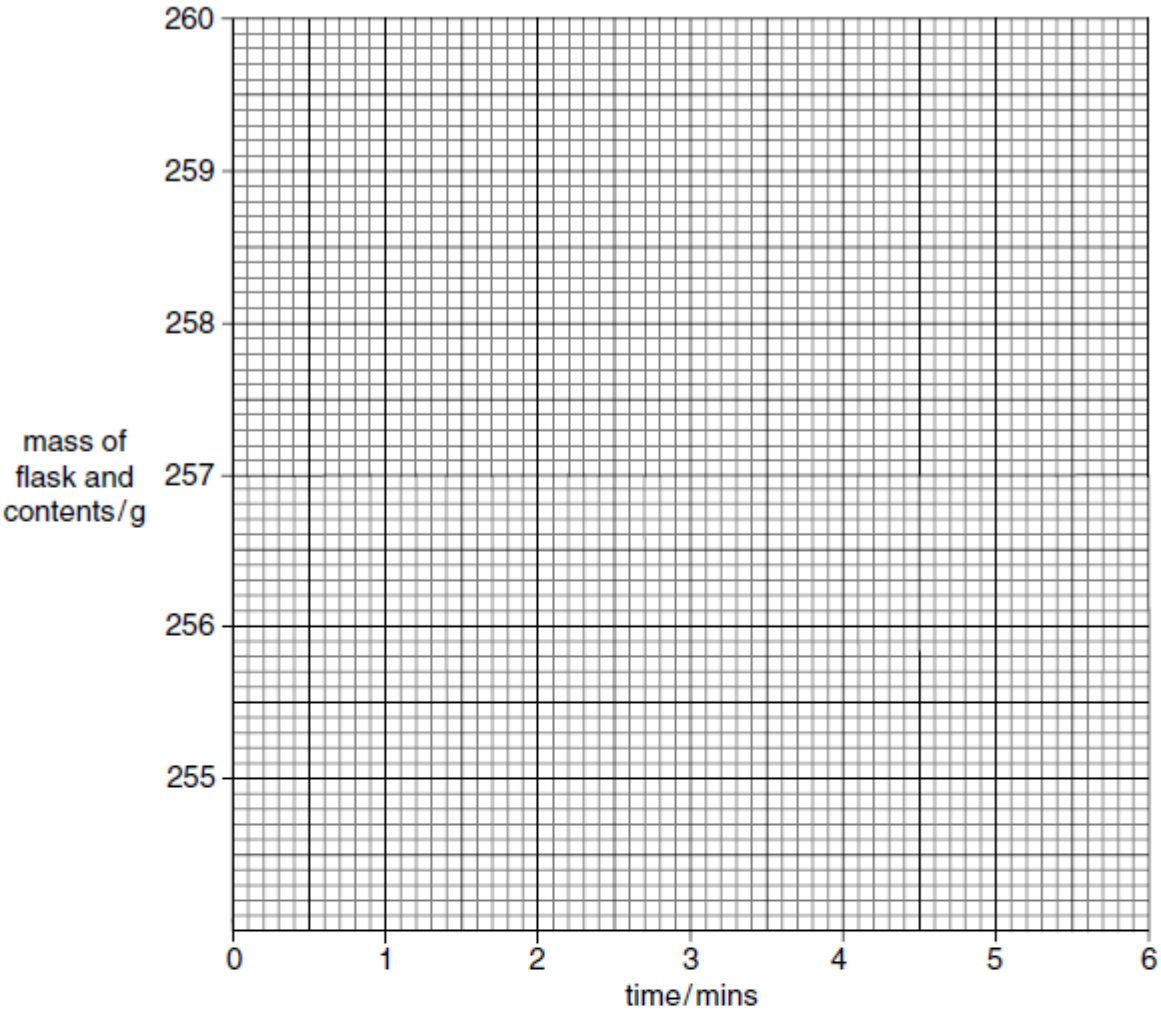
3 Dilute nitric acid was added to a large amount of magnesium carbonate in a conical flask as shown.



The flask was placed on a balance and the mass of the flask and contents recorded every minute. The results are shown in the table.

time / min	0	1	2	3	4	5	6
mass of flask and contents / g	260.0	257.9	256.8	256.6	255.8	255.6	255.6

(a) Plot the results on the grid and draw a smooth line graph. [3]



(b) Which result appears to be inaccurate? Why have you selected this result?

.....

.....[2]

(c) Why does the mass of the flask and contents decrease?

.....[1]

(d) Suggest the purpose of the cotton wool.

.....[1]

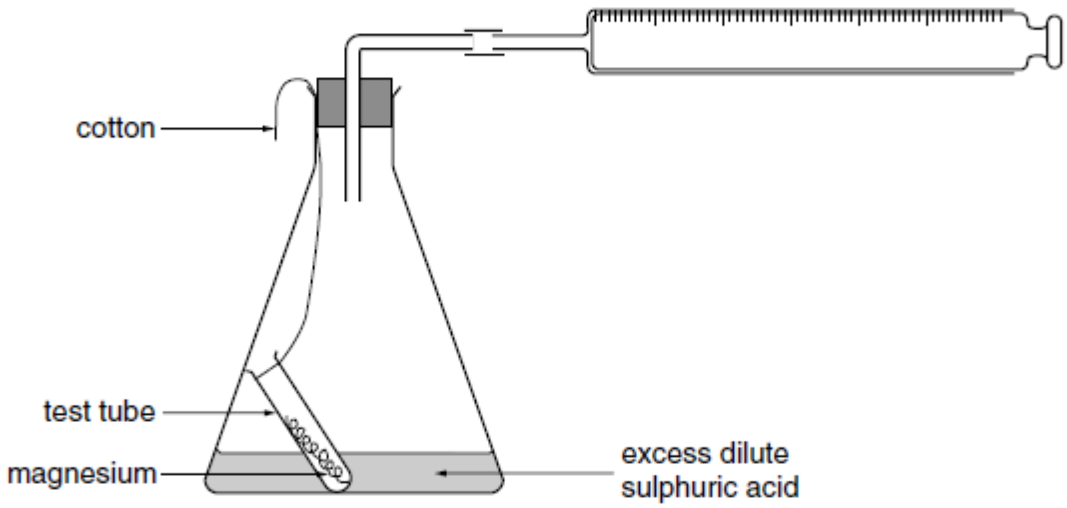
(e) At what time did the reaction finish?

.....[1]

(f) On the grid, sketch the graph you would expect if the experiment were repeated using nitric acid at a higher temperature. [2]

Q# 32/ iGCSE Chem/2002s/Paper 6/

3 The apparatus below was used to investigate the speed of the reaction between an **excess** of dilute sulphuric acid and 4 cm of magnesium ribbon.



(a) (i) What is the purpose of the test-tube?

.....[1]

(ii) What is the purpose of the gas syringe?

.....[1]

(b) How was the reaction started?

.....[1]

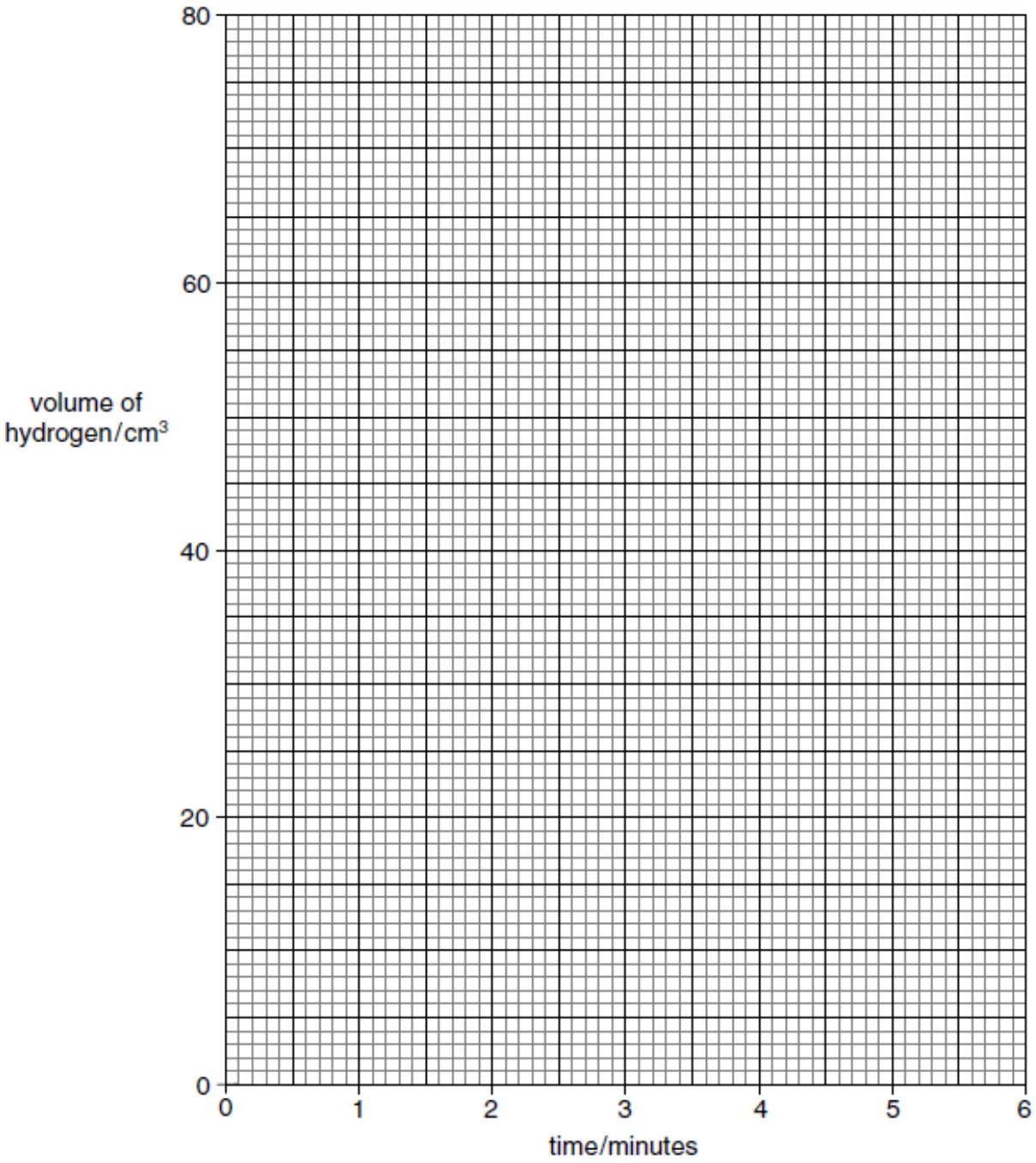
(c) What does an *excess* of sulphuric acid mean?

.....[1]

The reaction produced hydrogen. The results obtained are shown in the table.

Time/minutes	0	1	2	3	4	5	6
Volume of hydrogen /cm^3	0	28	42	64	76	80	80

(d) Plot the results on the grid below and draw a smooth line graph.



[3]

(e) Which result appears to be incorrect? Why have you selected this result?

.....

.....[2]

(f) From the graph work out the volume of hydrogen produced after 30 seconds. Indicate clearly on the grid how you used the graph.

.....[2]

(g) Sketch on the grid the graph you would expect if the experiment were repeated using 2 cm of magnesium. Label this graph **M**. [1]

Mark Scheme iG Chem 7 EQ P6 15w to 01w 353marks

Q# 1/ iGCSE Chem/2015/w/Paper 62/

Question	Answer	Marks	Guidance
3(a)	all temperatures correctly recorded: 23, 36, 47, 58, 70, 79 6 correct = 3 5 correct = 2 4 correct = 1 3 or fewer correct = 0	3	
3(b)	all points correctly plotted: 23, 36, 47, 58, 70, 79 6 correct = 2 5 correct = 1 4 correct = 0 smooth curve;	2 1	
3(c)	third point/at 47 °C or 99 s; not on smooth line/curve;	1 1	
3(d)	118; seconds/sec/s; indication on the graph;	1 1 1	
3(e)(i)	(it) increases/higher the temperature faster reaction;	1	**I:** references to time (rather than rate)
3(e)(ii)	particles have more energy/move faster; more (chance of/successful) collisions;	1 1	
3(f)(i)	slower reaction/longer time; smaller surface area;	1 1	
3(f)(ii)	sketch above the curve not touching the original at any point;	1	**A:** curve above but touching the anomalous point
3(g)	to prevent escape of/splash of acid; to allow carbon dioxide/gas to escape;	1 1	**R:** prevent spillages

Q# 2/ iGCSE Chem/2015s/Paper 6/

Question	Answer	Marks	Guidance

6	***step 1***
	add copper oxide or catalyst to hydrogen peroxide;
	measure volume of gas/mass loss/collect gas/count bubbles;
	over time;
	known volume of hydrogen peroxide;
	compare to hydrogen peroxide on its own;
	test gas with glowing splint;
	splint relights;
	
	step 2
	filter copper(II) oxide;
	dry;
	weigh;
	compare to original mass;
	OR
	filter (copper(II) oxide)/evaporate to dryness;
	add to hydrogen peroxide;
	measure rate of reaction;
	compare to first experiment;
		
		max 8	

Q# 3/ iGCSE Chem/2015march/Paper 6/

2 (a) Table of results

volume boxes completed correctly (3),
all 7 correct (3)
6 correct (2)
5 correct (1)
4 or fewer correct (0)

0, 45, 48, 72, 74, 75, 75 [3]

(b) points plotted correctly, including origin (3),
all 7 correct (3)
6 correct (2)
5 correct (1)
4 or fewer correct (0)

Smooth line graph(1) [4]

(c) (i) point at 2 min/3rd point/48 cm^3 (1)

off curve (1) [2]

(ii) reading from graph, 62–64 (cm^3) (1)

indication (1) [2]

(d) curve to left of original (1)

to same level (1) [2]

Q# 4/ iGCSE Chem/2014/w/Paper 6/

2 (a) smooth curve missing anomalous point (1) [1]

(b) composition of mixture
double volume / 100 cm^3 of hydrogen peroxide (1)
more than 1 g of manganese(IV) oxide / powdered (1) [2]
ignore: references to water
note: double the concentration is valid for (2)

explanation
double volume of gas (1)
faster reaction (1) [2]

(c) catalyst / increase the rate of the reaction (1) [1]

(d) sketch graph less steep than original for Experiment 1 (1)
to same level (1) [2]

Q# 5/ iGCSE Chem/2014s/Paper 6/

3 (a) volumes of hydrogen completed correctly (3)
0, 8, 34, 42, 46, 48, 48 [3]
guidance: 7 correct (3); 6 correct (2); 5 correct (1); 4 or fewer correct (0)

(b) points plotted correctly including origin (3)
guidance: 7 correct (3); 6 correct (2); 5 correct (1); 4 or fewer correct (0)

smooth curve missing anomalous point (1) [4]

(c) (i) point at 5 cm^3 / 8 cm^3 H_2 / second point (1) [1]

(ii) leak / loss / escape of gas or wrong amount / too little HC / or zinc (1) [1]
allow: syringe sticking

(iii) reading from graph (1) ± half small square

indication on graph (1) [2]

(d) excess acid (1)

all zinc reacted (1) [2]
allow: used up

(e) sketch curve identical (2)

different curve levelling out at 48 cm^3 (1) [2]
note: must be some indication of a second curve

Q# 6/ iGCSE Chem/2013/w/Paper 6/

5 (a) volumes completed correctly (4), –1 each incorrect [4]

time / s	catalyst R	catalyst S
0	0	0
30	23	16
60	34	36
90	59	51
120	66	63
150	71	69
180	72	72

(b) points plotted correctly (3) smooth curves (2) labels (1) [6]

(c) result at 60s / volume 34 / third result (1) [1]

(d) R (1) rate faster (1) [2]

(e) sketch to left of R graph / steeper (1) to same level (1) [2]

Q# 7/ iGCSE Chem/2013/w/Paper 6/

6 mass of silica gel (1)
heat in oven > 100 °C (1)
for specified realistic time / until turns blue (1)
reweigh (1) record (1)
heat in oven again to check constant mass / indication of colour change (1)
calculation (1) max [6]

Q# 8/ iGCSE Chem/2012/w/Paper 6/

4 **(a)** Table of results for Experiments [5]

all initial temperature boxes completed correctly (2)

25 41 47 62 72

all final temperature boxes completed correctly (2)

23 27 39 42 48

average temperatures completed correctly (1)

24 34 43 52 60

(b) points plotted correctly (4) [5]

smooth line graph (1)

(c) value from graph at 72 °C (1) ≈ 30–35 s [2]

extrapolation shown on grid (1)

(d) as an indicator owtte/check iodine present (1) [1]

(e) **(i)** experiment 5 (1) [1]

(ii) highest temperature (1) [2]

particles have more energy/more collisions/move faster (1)

(f) time longer/more/increase (1) [2]

speed slower/decrease (1)

(g) more accurate (1) [1]

Q# 9/ iGCSE Chem/2012s/Paper 6/

2 **(a)** thermometer readings correct (3), –1 for any incorrect

methanol	25	28	3
ethanol	26	39	13
propanol	23	46	23
butanol	24	58	34

temperature rises correct (1) [4]

(b) points plotted correctly ±1/2 small square (3)
straight line drawn with a ruler (1) [4]

(c) value from graph (1) unit (1) 44 °C
extrapolation shown on grid (1) [3]

Q# 10/ iGCSE Chem/2011s/Paper 6/

2 **(a)** any two variables max 2
- volume
- concentration of acid **allow** amount
- volume of sodium thiosulfate/total volume of solution
- temperature
- printed sheet
- same size flask

ignore reference to pressure/catalyst/surface area/light max [2]

(b) straight line drawn with a ruler, missing anomalous point but touching all other points (1)
not multiple lines [1]

(c) any two sensible errors that could be from same category max 2
- qualified measurement error e.g. volume
- qualified timing error
- recording error
- plotting error
- temperature variation
- contamination from previous experiment

not systematic error max [2]

(d) 0.056–0.064 range (1) indication on graph (1) [2]

(e) more particles/particles closer together (1) more collisions (1) [2]

(f) sketch straight line to the LEFT of the original (1) [1]

Q# 11/ iGCSE Chem/2010/w/Paper 6/

3 **(a)** idea of fair test / only one variable [1]

(b) nitric acid [1]

(c) **(i)** points plotted (3), –1 for each incorrect
smooth curve (1) [4]

(ii) value from graph 18 s (1) indication on graph (1) [2]

(d) times would be less / reaction quicker (1)
particles have more energy / increased collisions (1) [2]

Q# 12/ iGCSE Chem/2010s/Paper 6/

3 **(a)** volumes completed correctly
0, 60, 68, 95, 98, 99, 100 –1 for each incorrect [4]

(b) points plotted correctly (3) –1 for each incorrect
smooth curve (1) [4]

(c) point at 2 minutes (1) off curve owtte (1) [2]

(d) steeper curve (1)
levels out at same volume (1) [2]

Q# 13/ iGCSE Chem/2010s/Paper 6/

6 (a) arrow must be underneath solid in tube (1) [1]

(b) red/pink to blue (1) [1]

(c) to cool/condense (the water/steam) (1) [1]

(d) pressure would build up/air or gases needs to escape owtte (1) [1]

Q# 14/ iGCSE Chem/2009/w/Paper 6/

6 (a) points plotted correctly (2) - 1 for any incorrect
smooth curve (1) suitable scale (1) axes labelled (units not essential) (1) [5]
accept plot of loss in mass against time

(b) from graph, 180 g (ignore no units) (1)
indication on graph (1) [2]

(c) gas given off [1]

(d) to prevent loss of acid
not loss of water or steam [1]

(e) 4 minutes [1]

(f) sketched curve above original (1)
levelling out at 174 s or heading towards it (1) [2]

Q# 15/

4 (a) Table of results

initial temperature boxes completed correctly (2)	24	33	40	51	60
final temperature boxes correctly completed (2)	24	31	38	47	54
average temperature boxes correctly completed (1)	24	32	39	49	57

[5]

(b) 5 points correctly plotted (3), –1 for any incorrect
smooth line graph (1) [4]

(c) (i) experiment 5 (1) [1]

(ii) more energy owtte (1) particles move faster (1) more kinetic energy = 2
more collisions (1) [3]

(d) idea of a fair test/to compare effect of changing the temperature (1) [1]

(e) (i) value from graph approx 20 (1) unit (1)
extrapolation shown (1) [3]

(ii) curve sketched on grid below original curve (1) [1]

(f) change e.g. use of data logger/colourimeter (1) or use of lagging/insulation /repeat experiments or more values/use a burette or pipette

explanation e.g. timing of reaction more accurate (1) to reduce heat losses /average readings for times/volumes more accurate [2]

Q# 16/ iGCSE Chem/2008s/Paper 6/

6 **(a)** Table of results

volumes correctly completed (4), -1 for each incorrect

0, 18, 34, 42, 59, 63, 63 [4]

(a) points plotted correctly (3), -1 for each incorrect
smooth line curve (1) [4]

(c) reaction finished/all acid used up (1) [1]

(d) point at 3 minutes/at 42 cm^3 (1) does not fit curve owtte (1) [2]

(e) sketch line below plotted curve (1) levels off around 30 cm^3 (1) [2]

Q# 17/ iGCSE Chem/2007/w/Paper 6/

1 **(a)** **(i)** correct indication for crystals (1)

(ii) correct indication of heat (1) no labels but correct position max 1 [2]

(b) to cool/condense the water/gas/liquid (1) [1]

(c) blue (1) to white/grey (1) [2]

Q# 18/ iGCSE Chem/2007/w/Paper 6/

6 volumes correctly completed

time/minutes	volume/cm^3
0	0
2	18
4	30
6	33
8	42
10	45
12	46

[3]

(a) All points plotted correctly (2)
–1 for any incorrect
smooth line graph (1) [3]

(b) **(i)** at 6 minutes (1) [1]

(ii) 37/38 cm^3 (1) [1]

Q# 19/ iGCSE Chem/2007s/Paper 6/

6 table correctly completed

catalyst **W**	catalyst **X**
0	0
16	29
32	34
36	36
37	37
37	37
all correct (3)	-1 each incorrect

[3]

(b) graph
choice of suitable scale for y-axis (1)
all points correctly plotted (3)
smooth curves (1) labelled (1) [6]

(c) solid **X** (1)
faster reaction / more gas given off at 20/40 s (1) [2]

(d) same volume of hydrogen peroxide used in both experiments (1) [1]

(e) line sketched on grid with steeper slope than for catalyst **X** at 25°C (1)
levelling out at same level (1) [2]

Q# 20/ iGCSE Chem/2007s/Paper 6/

4 Table of results

Experiment 1
final reading box correctly completed, 39.2 (1)

Experiment 2
final reading box correctly completed (1)
differences completed correctly, 39.2 (1) and 20.6 (1) [4]

(a) as an indicator owtte [1]

(b) **(i)** Experiment 1 (1) [1]

(ii) more in Experiment 1 / greater volume (1) [1]

(iii) solution **A** more concentrated / stronger than **B** (1) approx ×2 (1) [2]

Q# 21/ iGCSE Chem/2006/w/Paper 6/

3 table of results
all volumes correct (2) 0, 9, 35, 62, 81, 88, 89 **[2]**
-1 for any incorrect

(a) graph
points (2) S-shaped curve joining all points(1) **[3]**

(b) exothermic/displacement/oxidation/redox(1) **[1]**

(c) (i) slow at start/speeds up/slows down at end max 2 **[2]**

(ii) surface dirty owtte at start/then clean/calcium being used up/warms up max 2 **[2]**

Q# 22/ iGCSE Chem/2006s/Paper 6/

4 Volumes from cylinder diagrams

Experiment 2

0 16 31 39 all correct (2) **[2]**

-1 for any incorrect

Experiment 3

0 9 17 21 all correct (2) **[2]**

Experiment 4

0 6 11 14 all correct (2) **[2]**

(a) Graph. All points plotted correctly (3). -1 for each incorrect

smooth curves (1), labels (1) **[5]**

(b) (i) Experiment 1 (1) **[1]**

(ii) Most concentrated solution (1), more collisions (1) **[2]**

(c) (i) Two errors (2)

e.g. amount of catalyst/timing/volume of solution **[2]**

(ii) Two improvements (2)

e.g. measure mass of catalyst/use burette or pipette/data logging **[2]**

(d) Filter (1), same mass of catalyst before and after (1)/repeat experiment and compare volumes of gas collected **[2]**

Q# 23/ iGCSE Chem/2005/w/Paper 6/

4 **Table of results:**

volumes of gas correctly completed (21, 24, 39, 47 and 56)
- 1 for each incorrect **[3]**

(a) points correctly plotted in graph (3), - 1 for each incorrect

straight line (1) **[4]**

(b) experiment 2 (1)

not on line (1) **[2]**

(c) **(i)** experiment 5 (1)

(ii) strongest/more concentrated acid (1)

more collisions (1) **[3]**

(d) marble chip visible (1)

acid used up (1) **[2]**

(e) (i) e.g. size of chips different/starting the timer [1]

(ii) measure mass of chips/time individual experiments [1]

Q# 24/ iGCSE Chem/2005s/Paper 6/

8 same amount/measured volume of peroxide (1)

add known mass of metal oxide (1)

time (1) measure volume of oxygen (1)

repeat with other oxide (1) compare/conclusion (1) [6]

method will not work = 0

Q# 25/ iGCSE Chem/2004/w/Paper 6/

2 (a) smooth line/curve (1) **(1)**

(b) result at 60s (1) not on curve or similar (1) **(2)**

(c) calcium carbonate is being used up/acid gets more dilute (1) **(1)**

Q# 26/ iGCSE Chem/2004s/Paper 6/

7 (a) Anhydrous copper sulphate/cobalt chloride 1
Goes blue/pink in water, no change for ethanol 1 [2]

Q# 27/ iGCSE Chem/2004s/Paper 6/

8 Add known mass of manganese oxide 1
To (measured volume of) hydrogen peroxide 1
Bubbles 1
Test gas with glowing splint 1
Result 1
Filter 1
Dry solid 1
Reweigh and compare 1
(max 6) [6]

Q# 28/ iGCSE Chem/2003/w/Paper 6/

3	Table. Times read correctly: 4s (1) 8s (1) 14s (1) 30s (1) 82s (1)	5
(a)	Points plotted correctly (3) (-1 for each incorrect) Smooth line graph (1)	4
(b)	Read from graph – should be ≃ 48 (1) s (1) Indication on graph (1)	2 1
(c) (i)	Experiment 1 (1)	1
(ii)	Greatest concentration/amount of bromate (1) Therefore more collisions (1)	2

(d)	(i)	Two errors: e.g. use of m cylinder inaccurate (1)/use of timer (1)/detecting when cross not visible	2
	(ii)	Improvements: e.g. use of burette (1)/use of computer data logging (1)/use of colourimeter (1) insulate repeat and average	2

Q# 29/ iGCSE Chem/2003s/Paper 6/

2	(a)		because precipitate formed/goes cloudy (1) sulphur (1)/turbid	[2]
	(b)		reference to fair test/comparison/same depth	[1]
	(c)		sodium thiosulphate/water 1st/2nd acid, last	[1]
	(d)	(i)	all points correct (3), -1 for any incorrect smooth line (1) label (1)	[5]
		(ii)	line lower down (1) does not touch other line (1)	[2]
	(e)		times would be longer (1) because solution more spread out/reference to surface area/depth (1)	[2]

Q# 30/ iGCSE Chem/2003s/Paper 6/

5	(a)	(i)	Smooth line graph	[1]
		(ii)	result at 5 minutes (1) not on curve (1)/gas escapes, gone down	[2]
	(b)		0.8 g	[1]
	(c)		reference to leak/loss of gas (1) ∴ volumes lower (1)	[2]

Q# 31/ iGCSE Chem/2002/w/Paper 6/

3	(a)	Points correctly plotted (2), −1 for each incorrect. Smooth line graph, ignoring 3 minutes point (1) 3
	(b)	Point at 3 minutes, 25.6g (1) not on curve (1) 2
	(c)	gas given off (1) 1
	(d)	to prevent loss of acid (spray) (1) / only gas out 1

(e)	5 minutes (1)	1
(f)	Sketch graph below original graph (1)	2
	levelling off at same mass (1)	

Q# 32/ iGCSE Chem/2002s/Paper 6/

3 (a)(i)	to keep the magnesium out of contact with acid or similar (1)	1
(ii)	to measure volume of gas (1) not collect	1
(b)	shake the flask/let go collon (1)	1
(c)	excess - more than enough to react (1)	1
(d)	Grid All points correctly plotted (2) (-1 for each incorrect) Smooth line graph (1)	3
(e)(i)	At 2 minutes (1) not on smooth curve (1)	2
(ii)	15 cm^3 (±1) (1), indication (1)	2
(g)	curve on/below original graph levelling out at 40 cm^3 (1)	1