

# Stoichiometry

## Question Paper

<b>Level</b>	IGCSE
<b>Subject</b>	Chemistry
<b>Exam Board</b>	CIE
<b>Topic</b>	Stoichiometry
<b>Sub-Topic</b>	
<b>Paper Type</b>	Alternative to Practical
<b>Booklet</b>	Question Paper

**Time Allowed:** 65 minutes

**Score:** /54

**Percentage:** /100

1 The diagram shows two bottles of liquid oven cleaner.



The oven cleaners contain sodium hydroxide solution. Plan an investigation to show which oven cleaner contains the highest concentration of sodium hydroxide.

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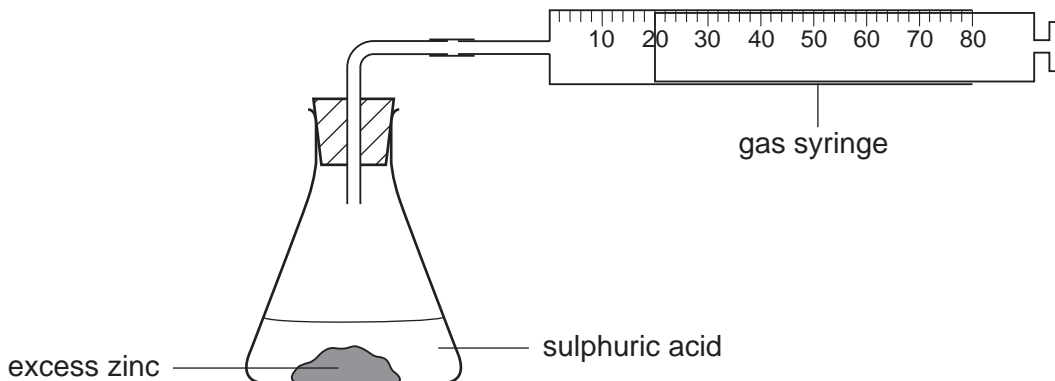
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[6]

- 2 In a set of experiments zinc was reacted with sulphuric acid to form hydrogen. The apparatus below was used.

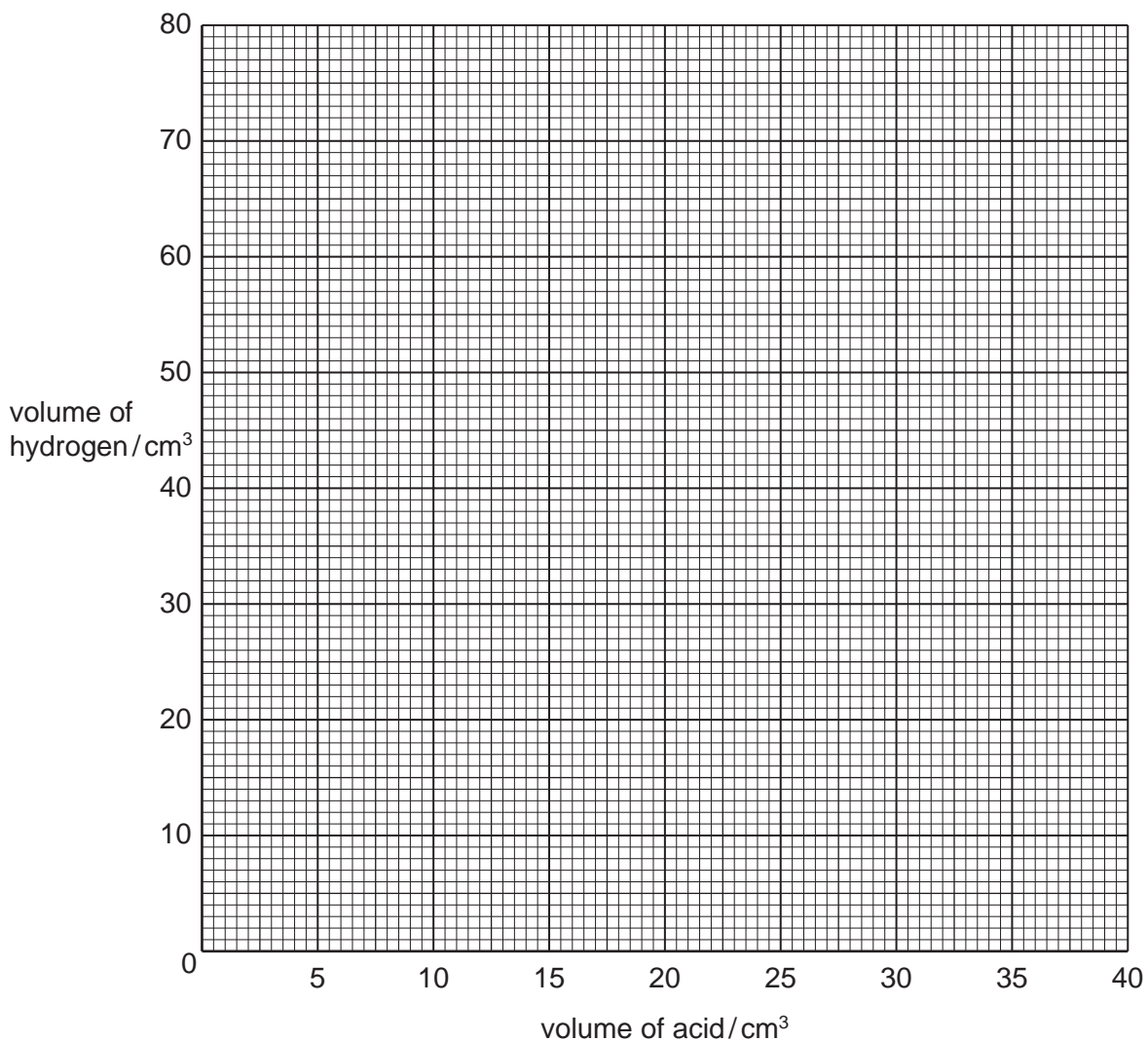


The same mass of zinc was used each time. The volume of acid used was different each time. Use the syringe diagrams to record the volume of hydrogen produced each time in the table.

Table of results

volume of sulphuric acid/cm <sup>3</sup>	syringe diagram	volume of hydrogen/cm <sup>3</sup>
0		
5		
15		
20		
25		
30		
35		
40		

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



[4]

(b) Use the graph to find the volume of sulphuric acid that will produce 33 cm<sup>3</sup> of gas.

..... [1]

(c) What volume of gas is produced if 10 cm<sup>3</sup> of sulphuric acid is used?

..... [1]

- 3 A student investigated what happened when sodium thiosulphate dissolved in water.

*Experiment 1*

By using a measuring cylinder, 20 cm<sup>3</sup> of distilled water was poured into a polystyrene cup. Use the thermometer diagram to record the temperature of the water in the table.

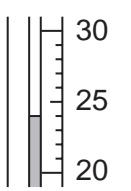
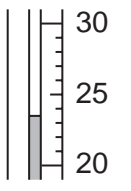
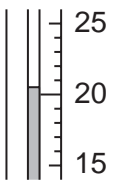
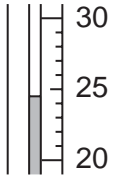
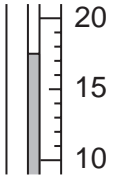
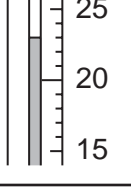
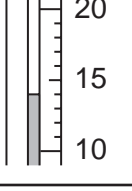
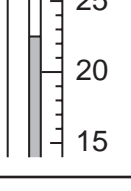
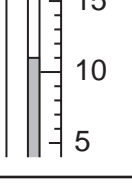
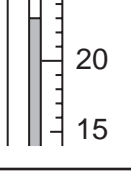

1 g of powdered sodium thiosulphate was added to the cup and the mixture stirred with a thermometer. Use the thermometer diagram to record the temperature of the solution.

*Experiment 2*

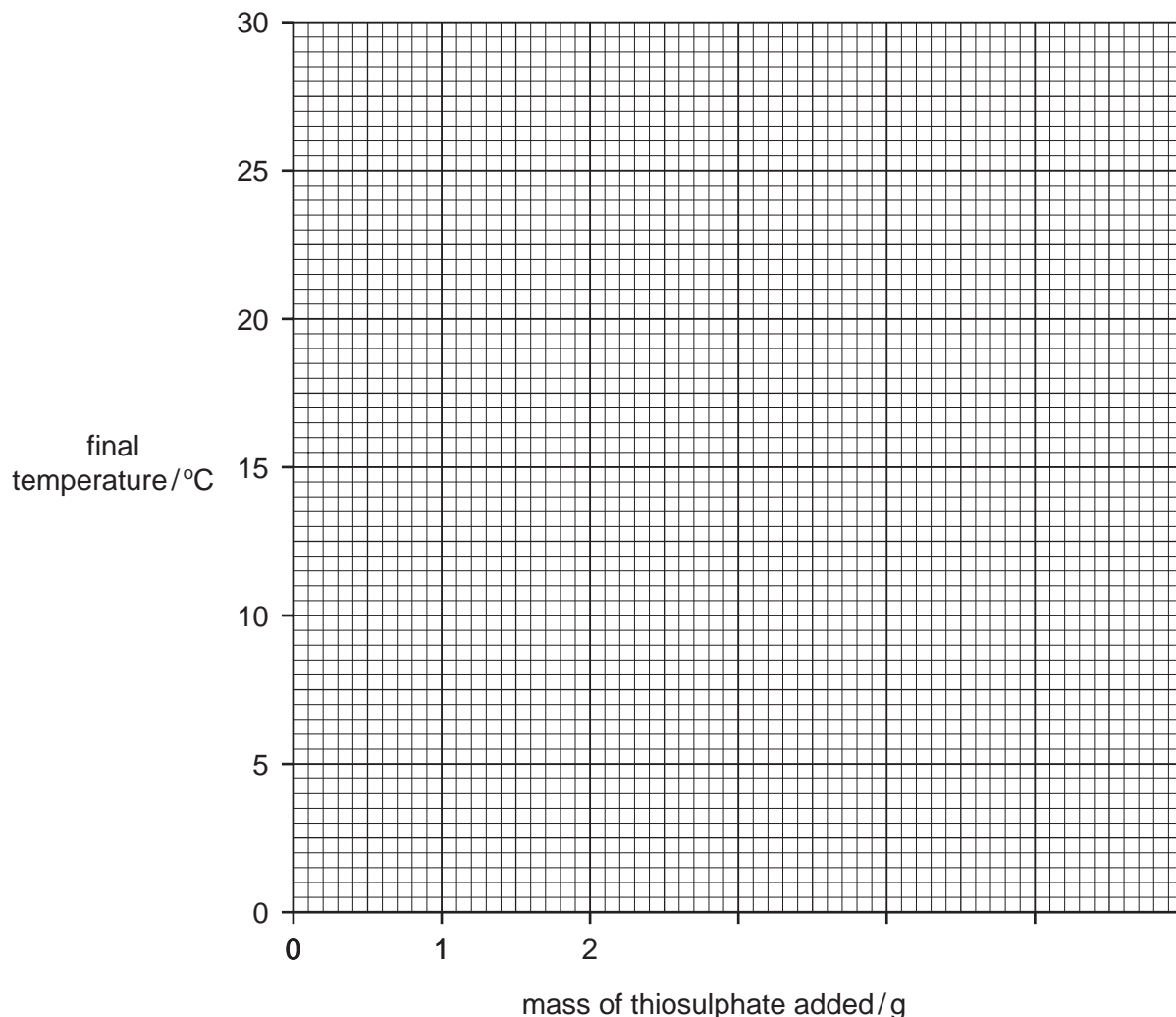
*Experiment 1* was repeated using 2 g of powdered sodium thiosulphate. Record the temperature in the table.

*Experiments 3, 4 and 5*

*Experiment 1* was repeated using 3 g, 4 g and 5 g of powdered sodium thiosulphate respectively. Record the temperatures in the table.

mass of sodium thiosulphate /g	temperature /°C			
	initial		final	
0				
1				
2				
3				
4				
5				

- (a) Plot the results of the experiments on the grid below. Draw a straight line graph. Clearly label the graph. [5]



- (b) (i) Use your graph to estimate the temperature of the reaction mixture if 3.5 g of powdered sodium thiosulphate were added to 20 cm<sup>3</sup> of water.

Indicate clearly on the graph how you obtained your answer.

..... [2]

- (ii) From your graph work out the temperature of the reaction mixture if 6 g of powdered sodium thiosulphate were added to 20 cm<sup>3</sup> of water.

Indicate clearly how you used your graph.

..... [2]

- (c) What type of chemical reaction occurs when sodium thiosulphate dissolves in water?

..... [1]

(d) Explain how the temperature changes would differ in the experiments if 40 cm<sup>3</sup> of water were used.

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.....  
..... [2]

(e) Explain why the sodium thiosulphate was powdered before being used.

.....  
..... [2]

(f) Predict what the temperature of the reaction mixture in *Experiment 5* would be after 1 hour. Explain your answer.

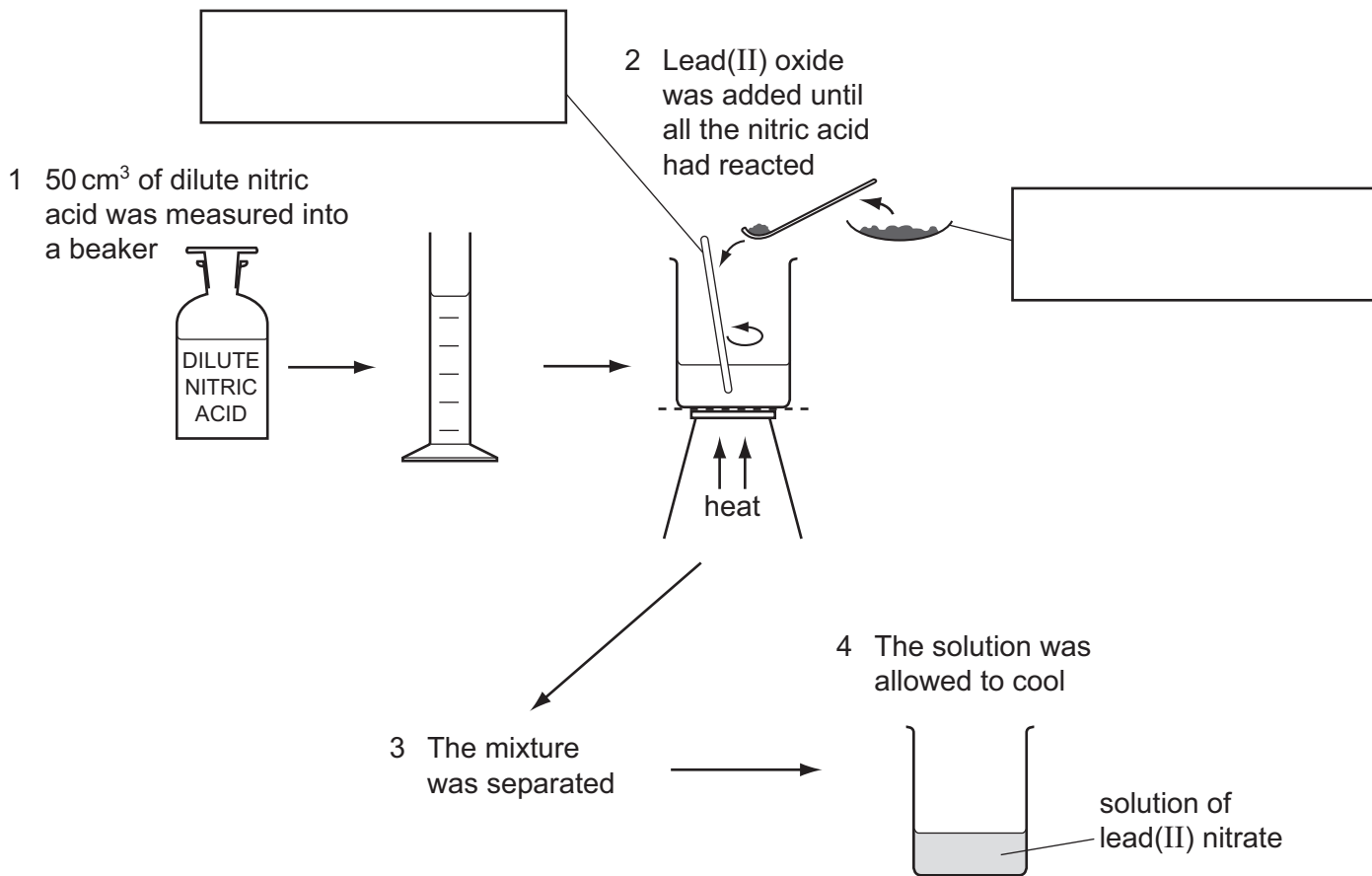
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..... [2]

(g) Suggest **one** change you could make to the **apparatus** used in the experiments to obtain more accurate results.

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..... [1]



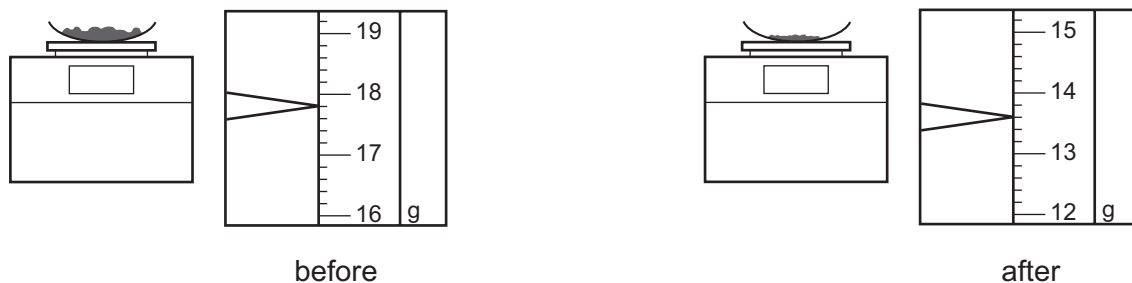
4 A student reacted dilute nitric acid with lead(II) oxide to prepare lead(II) nitrate. The diagram shows the stages in the method used.



(a) Complete the boxes to identify the pieces of apparatus. [2]

(b) Why is the dilute nitric acid heated?  
 ..... [1]

(c) The lead(II) oxide was weighed before and after the additions.



Use the balance diagrams to work out the mass of lead(II) oxide added to the dilute nitric acid.  
 ..... [2]

- (d) (i) How would the student know when all of the dilute nitric acid had reacted in stage 2?  
..... [1]
- (ii) What method is used to separate the mixture in stage 3?  
..... [1]
- (iii) What term is used to describe the unreacted lead(II) oxide?  
..... [1]
- (e) Describe the effect of heating the solution of lead(II) nitrate until it boils and then heating for a further ten minutes.  
.....  
.....  
..... [2]

[Total: 10]

- 5** Seawater contains sodium chloride and other salts.  
Plan an experiment to find the mass of salts in 1 dm<sup>3</sup> of seawater.  
You will be provided with a small bottle of seawater.  
You should include details of the method and any apparatus used.  
(1 dm<sup>3</sup> = 1000 cm<sup>3</sup>)

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..... [6]

[Total: 6]