Topical Past Papers

IGCSE Chemistry (0620) Paper 6

[Alternative to Practical]

Exam Series: February/March 2019 – May/June 2025

Format Type B:
Each question is followed by its answer scheme

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Introduction

Each Topical Past Paper Questions Workbook contains a comprehensive collection of hundreds of questions and corresponding answer schemes, presented in worksheet format. The questions are carefully arranged according to their respective chapters and topics, which align with the latest IGCSE or AS/A Level subject content. Here are the key features of these resources:

1. The workbook covers a wide range of topics, which are organized according to the latest syllabus content for Cambridge IGCSE or AS/A Level exams.
2. Each topic includes numerous questions, allowing students to practice and reinforce their understanding of key concepts and skills.
3. The questions are accompanied by detailed answer schemes, which provide clear explanations and guidance for students to improve their performance.
4. The workbook's format is user-friendly, with worksheets that are easy to read and navigate.
5. This workbook is an ideal resource for students who want to familiarize themselves with the types of questions that may appear in their exams and to develop their problem-solving and analytical skills.

Overall, Topical Past Paper Questions Workbooks are a valuable tool for students preparing for IGCSE or AS/A Level exams, providing them with the opportunity to practice and refine their knowledge and skills in a structured and comprehensive manner. To provide a clearer description of this book's specifications, here are some key details:

- Title: Cambridge IGCSE Chemistry (0620) Paper 6 Topical Past Papers
- Subtitle: Exam Practice Worksheets With Answer Scheme
- Examination board: Cambridge Assessment International Education (CAIE)
- Subject code: 0620
- Years covered: February/March 2019 – May/June 2025
- Paper: 6
- Number of pages: 515
- Number of questions: 184

Contents

Chapter 1

Electrochemistry

1.1 Electrolysis

1. 0620_m25_qp_62 Q: 4

Metal spoons can be electroplated with silver.

Describe how a metal spoon can be electroplated with silver. Include in your answer how you could determine the mass of the silver electroplated onto the metal spoon.

You are provided with solid silver nitrate, a metal spoon, a piece of solid silver, distilled water and common laboratory apparatus.

You must include a diagram in your answer.

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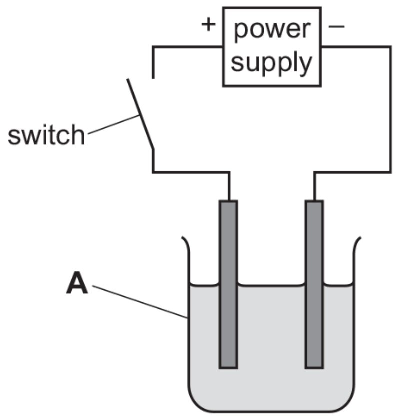
.... [6]

Answer:

Question	Answer	Marks
	any 6 from **MP1** find mass of spoon **MP2** silver nitrate dissolved in water **MP3** diagram showing complete circuit with electrodes in silver nitrate (solution) / electrolyte and a power supply **MP4** spoon / object to be plated as negative electrode / cathode in electrolysis **MP5** silver used as one of the electrodes in electrolysis After electrolysis **MP6** wash and dry spoon **MP7** find mass of spoon again (**after electrolysis)** and mass of silver = new mass – original mass	**6**

2. 0620_w20_qp_62 Q: 1

The diagram shows the apparatus used to pass an electric current through concentrated hydrochloric acid. Hydrogen and chlorine were formed at the electrodes.



(a) Name the item of apparatus labelled **A**.

.... [1]

(b) The electrodes were made of platinum.

(i) Give **two** reasons why platinum is a suitable material for the electrodes.

1 ....

2 ....
[2]

(ii) Suggest another material suitable to use as electrodes in this experiment.

.... [1]

(c) The teacher doing this experiment wore safety glasses, gloves, had their hair tied back and stood up throughout the experiment.

State **one** other safety precaution that should be taken when doing this experiment.
Explain your answer.

safety precaution ....

explanation ....
[2]

[Total: 6]

Answer:

Question	Answer	Marks
(a)	beaker	**1**
(b)(i)	conduct electricity	**1**
	inert	**1**
(b)(ii)	carbon / graphite	**1**
(d)	use a fume cupboard	**1**
	chlorine is toxic	**1**

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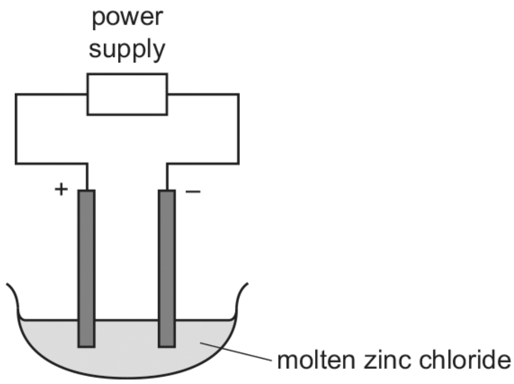
3. 0620_m19_qp_62 Q: 1

A chemist heated solid zinc chloride until it became molten. The apparatus shown was then used to pass electricity through the molten zinc chloride using inert electrodes.



A silver-coloured solid was formed at the negative electrode (cathode).

(a) Name the process of breaking down a substance using electricity.

.... [1]

(b) A Bunsen burner was used to heat the zinc chloride.

Describe how a Bunsen burner is adjusted to give a very hot flame.

....

.... [1]

(c) Suggest and explain the expected observation at the positive electrode (anode).

....

.... [2]

(d) Suggest why iron electrodes **cannot** be used in this experiment.

.... [1]

(e) (i) What difference would the chemist observe at the negative electrode if aqueous zinc chloride were used, rather than molten zinc chloride?
Explain you answer.

difference ....

explanation ....

.... [2]

(ii) When electricity is used to break down concentrated aqueous zinc chloride, chlorine is produced at the positive electrode.

Describe a test for chlorine.

test ....

observations .... [2]

(f) The bottle of zinc chloride is labelled *corrosive*.

State **one** safety precaution that should be taken when using zinc chloride.

.... [1]

[Total: 10]

Answer:

1(a)	Electrolysis	**1**
1(b)	Open (air hole / collar)	**1**
1(c)	Fizzing / bubbles / green gas	**1**
	Chlorine / Cl_2	**1**
1(d)	Iron reacts (with <u>chlorine</u>) / iron is reactive / not inert	**1**
1(e)(i)	Bubbles / effervescence / fizzing	**1**
	Hydrogen (is below zinc in the reactivity series)	**1**
1(e)(ii)	Litmus	**1**
	Bleached / turns white	**1**
1(f)	Wear gloves / goggles	**1**

Chapter 2

Acids, bases and salts

2.1 The characteristic properties of acids and bases

4. 0620_s20_qp_62 Q: 4

Many window-cleaning products contain aqueous ammonia. Aqueous ammonia is an alkali that reacts with dilute acids.

Plan an investigation to find which of two window-cleaning products contains the most concentrated aqueous ammonia. Include in your plan:

- the method you will use
- how your results will be used to determine which window-cleaning product contains the most concentrated aqueous ammonia.

You are provided with an aqueous solution of the two window-cleaning products, dilute hydrochloric acid of known concentration and common laboratory apparatus.

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.... [6]

Answer:

Question	Answer	Marks
	Any six from: • stated / equal volumes of each cleaner • measured with pipette / measuring cylinder / burette into a beaker or flask • named indicator added • add hydrochloric acid • from a burette • until indicator changes colour • record / calculate volume acid added • biggest volume of acid is most concentrated	6

2.2 Preparation of salts

5. 0620_s19_qp_62 Q: 1

A student did the following steps to make zinc chloride crystals from solid zinc oxide.

step 1 Pour 40 cm^3 of dilute hydrochloric acid into a beaker. Add a small amount of zinc oxide. Warm the mixture and stir it.
step 2 Continue to add zinc oxide to the beaker until all of the dilute hydrochloric acid has reacted.
step 3 Remove the excess zinc oxide.
step 4 Obtain crystals of zinc chloride from the solution.

(a) Name the apparatus used in **step 1** to:

(i) add the zinc oxide

.... [1]

(ii) warm the mixture.

.... [1]

(b) How did the student know that all of the dilute hydrochloric acid had reacted in **step 2**?

....

.... [1]

(c) **(i)** What is meant by the term *excess* in **step 3**?

.... [1]

(ii) How is the excess zinc oxide removed in **step 3**?

.... [1]

(d) Describe how the crystals are obtained in **step 4**.

....

....

.... [3]

(e) Suggest how the method would differ if zinc carbonate were used instead of zinc oxide.

.... [1]

[Total: 9]

Answer:

(a)(i)	spatula	**1**
(a)(ii)	Bunsen (burner)	**1**
(b)	solid remains / ZnO stops dissolving / reacting	**1**
(c)(i)	more than enough to react	**1**
(c)(ii)	filtration / filter	**1**
(d)	heat / evaporate solution	**1**
	to crystallising point / until saturated	**1**
	leave to cool	**1**
(e)	heating / warming not necessary (in step 1)	**1**

Chapter 3

Experimental techniques and chemical analysis

3.1 Experimental design

6. 0620_m25_qp_62 Q: 2

A student investigates the temperature change when aqueous copper(II) sulfate reacts separately with two different metals, zinc and iron.

The student does two experiments.

Experiment 1

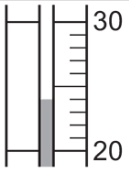
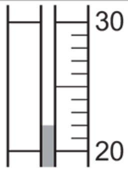
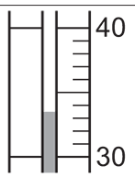
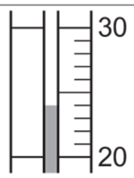
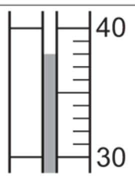
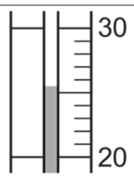
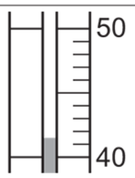
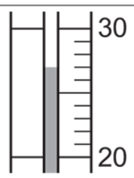
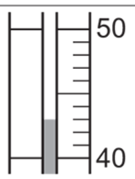
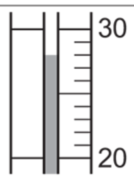
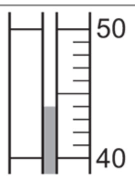
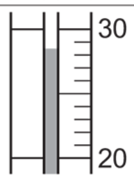
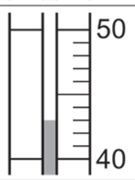
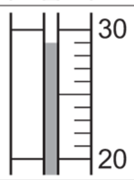
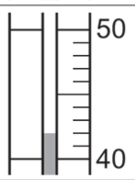
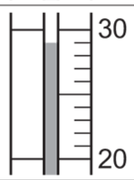
- Use a 50 cm^3 measuring cylinder to pour 30 cm^3 of aqueous copper(II) sulfate into a 100 cm^3 beaker.
- Use a thermometer to measure the temperature of the contents of the beaker.
  This is the temperature at time = 0 s.
- Add 3 g of zinc powder to the beaker. At the same time start a stop-watch.
- Using the thermometer, continually stir the mixture in the beaker.
- Measure the temperature of the mixture every 30 seconds for 210 seconds.
- Empty and rinse the beaker with distilled water.

Experiment 2

- Repeat Experiment 1, using 3 g of iron powder instead of 3 g of zinc powder.

(a) Complete Table 2.1 by using the thermometer diagrams and calculating the temperature changes from the temperature at 0 s.

Table 2.1

	Experiment 1			Experiment 2		
time in s	thermometer diagram	temperature in °C	temperature change since time = 0 s in °C	thermometer diagram	temperature in °C	temperature change since time = 0 s in °C
0		24.0	0.0		22.0	0.0
30						
60						
90						
120						
150						
180						
210						

[4]

(b) Complete a suitable scale on the *y*-axis, and plot your results for Experiment 1 and Experiment 2 on Fig. 2.1. The point at (0, 0) has been plotted for you.

Draw **two** curves of best fit. Both curves must start at (0, 0).

Label both curves.

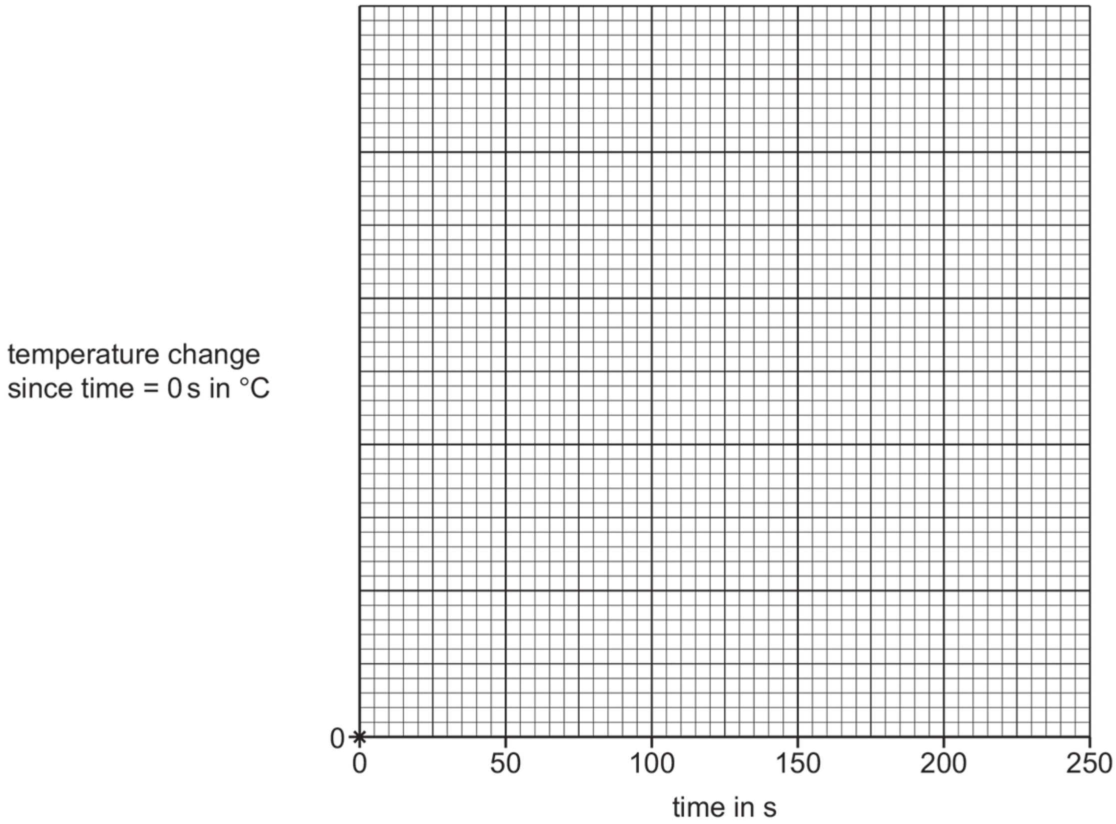


Fig. 2.1

[5]

(c) Extrapolate the curve for Experiment 1 on your graph in Fig. 2.1 to deduce the temperature change since time = 0 s in Experiment 1 after 240 seconds.

Show clearly **on Fig. 2.1** how you worked out your answer.

temperature change = ...

[3]

(d) State which experiment, Experiment 1 or Experiment 2, is the more exothermic. Explain your answer.

more exothermic experiment ....

explanation ....

....

[1]

(e) Predict the temperature of the solution in Experiment 1 after 3 hours.

temperature after 3 hours = ... °C [1]

(f) Explain why using a copper container instead of the beaker would **not** be an improvement in this investigation.

....

.... [1]

(g) Describe **two** changes to the **apparatus** that will improve the results of this investigation. For each change, explain why it will improve the results.

change 1 ....

explanation 1 ....

....

change 2 ....

explanation 2 ....

....

[4]

[Total: 19]

Answer:

Question	Answer	Marks
(a)	**M1** all 7 temperatures correct for experiment 1 (33.5, 38.0, 41.5, 43.0, 44.0, 43.0, 42.0)	1
	M2 all 7 temperatures correct for experiment 2 (24.0, 25.5, 27.0, 28.0, 28.5, 29.0, 29.0)	1
	M3 all temperature changes correct (9.5, 14.0, 17.5, 19.0, 20.0, 19.0, 18.0) (2.0, 3.5, 5.0, 6.0, 6.5, 7.0, 7.0)	1
	M4 all temperatures and temperature changes are recorded to 1 dp	1
(b)	**M1** suitable scale for y-axis	1
	M2 M3 plotting – all 14 correct scores 2, 13 correct scores 1	2
	M4 best fit curve for experiment 2	1
	M5 correct labels	1

Question	Answer	Marks
(c)	**M1** extrapolation shown on graph, this must be a sensible continuation of line for experiment 1	**1**
	M2 correct reading from 240 for their extrapolation on graph	**1**
	M3 °C	**1**
(d)	experiment 1 / zinc **and** greater temperature change / increase	**1**
(e)	24(.0)	**1**
(f)	copper is a good conductor (of heat)	**1**
(g)	changes may be either way round **M1** change 1: use a polystyrene cup / insulation / lid	**1**
	M2 explanation 1: reduce / less heat lost	**1**
	M3 change 2: use a burette (for the aqueous copper(II) sulfate)	**1**
	M4 explanation 2: (more) accurate (than a measuring cylinder)	**1**

7. 0620_s25_qp_61 Q: 2

A student investigates how the rate of reaction of magnesium ribbon with dilute acid changes as the concentration of the acid is changed. The student uses five solutions of the same acid, **A**, **B**, **C**, **D**, and **E**. Each solution has a different concentration. The acid is in excess in all experiments.

The student does five experiments.

Experiment 1

- Use a 50 cm^3 measuring cylinder to pour 30 cm^3 of acid **A** into a 100 cm^3 conical flask.
- Add a coil of magnesium ribbon to the acid in the conical flask and immediately start a stop-watch.
- Continually swirl the mixture in the conical flask until the magnesium ribbon disappears completely. Immediately stop the stop-watch and record the time in seconds to the nearest second.
- Empty and rinse the conical flask with distilled water.

Experiment 2

- Repeat Experiment 1 using 30 cm^3 of acid **B** instead of acid **A**.

Experiment 3

- Repeat Experiment 1 using 30 cm^3 of acid **C** instead of acid **A**.

Experiment 4

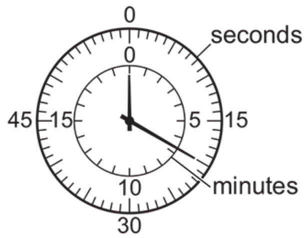
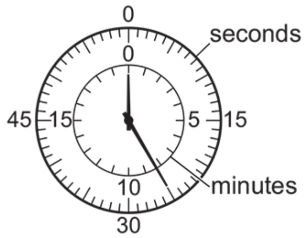
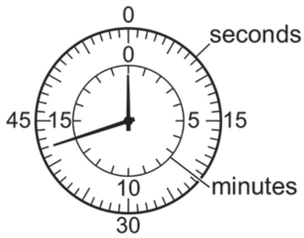
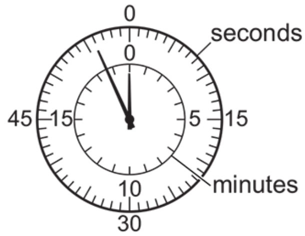
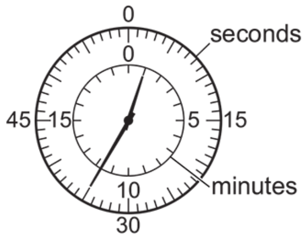
- Repeat Experiment 1 using 30 cm^3 of acid **D** instead of acid **A**.

Experiment 5

- Repeat Experiment 1 using 30 cm^3 of acid **E** instead of acid **A**.

(a) Use the stop-watch diagrams to complete Table 2.1

Table 2.1

experiment	acid	concentration of acid in mol/dm^3	stop-watch diagram	time for magnesium to disappear in s
1	**A**	2.0		
2	**B**	1.5		
3	**C**	1.0		
4	**D**	0.8		
5	**E**	0.5		

[2]

(b) Write a suitable scale on the *y*-axis and plot the results from Experiments 1 to 5 on Fig. 2.1.

Draw a line of best fit.

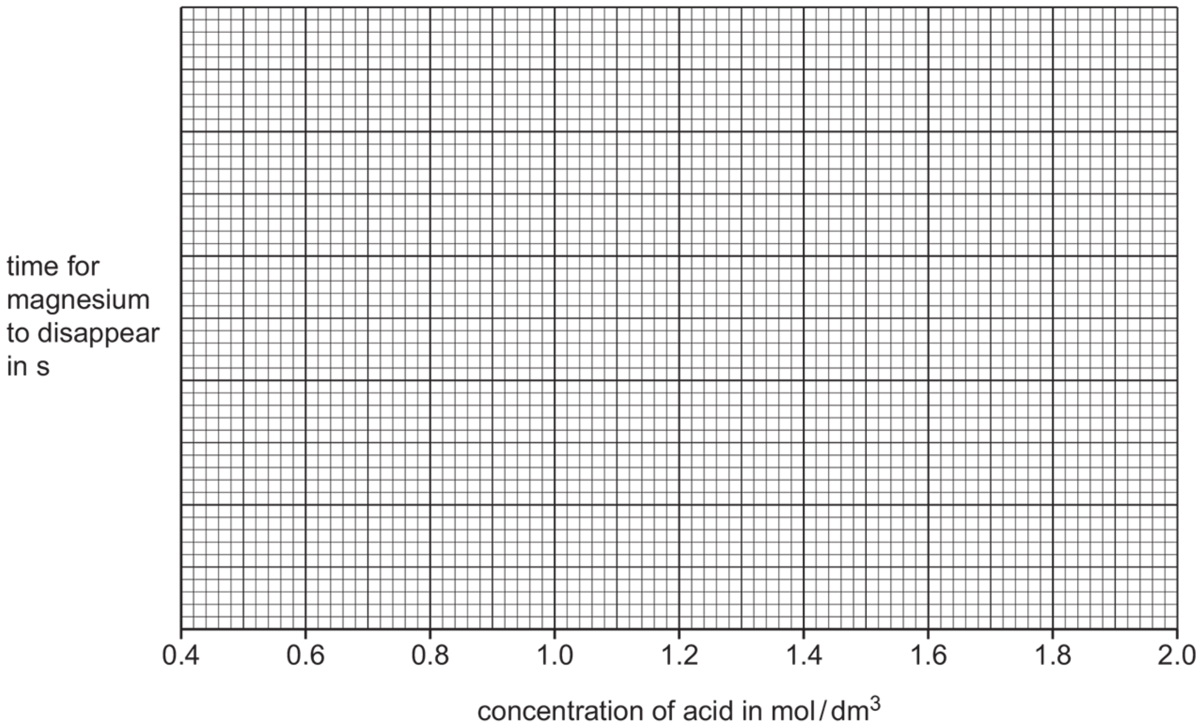


Fig. 2.1

[4]

(c) From your graph in Fig. 2.1, deduce the time for the magnesium to disappear when the concentration of the acid is 1.3 mol / dm^3.

Show clearly on Fig. 2.1 how you worked out your answer.

time for magnesium to disappear = ... s [2]

(d) The mean rate of reaction is calculated using the equation shown.

$$\text{mean rate of reaction} = \frac{\text{length of magnesium ribbon in cm}}{\text{time for magnesium to disappear in s}}$$

The length of each coil of magnesium ribbon used in all five experiments was 5 cm.

(i) Calculate the mean rate of reaction in Experiment 1. Give units for the rate you have calculated.

mean rate of reaction = ...

units ....

[2]

(ii) Deduce in which Experiment, 1, 2, 3, 4 or 5, the mean rate of reaction is the slowest.

.... [1]

(e) Explain why repeating each experiment is an improvement.

....

.... [1]

(f) The student does another experiment to find the temperature change when magnesium reacts with acid **A**.

- Use the measuring cylinder to pour 30 cm^3 of acid **A** into the 100 cm^3 conical flask.
- Measure the initial temperature of the acid in the conical flask.
- Add a coil of magnesium ribbon to the acid in the conical flask.
- Continually swirl the conical flask until the magnesium ribbon disappears completely.
- Measure the final temperature of the acid in the conical flask.

(i) Use the thermometer diagrams to complete Table 2.2.

Table 2.2

thermometer diagram for initial temperature	initial temperature / °C	thermometer diagram for final temperature	final temperature / °C	temperature change / °C
				

[2]

(ii) Explain why controlling the temperature of the acid so that it remains constant is an improvement.

....

.... [1]

(iii) Explain why using a polystyrene cup instead of the 100 cm^3 conical flask does **not** control the temperature of the acid.

....

.... [1]

(iv) Describe how the temperature of the acid can be controlled and kept constant.

....

.... [1]

[Total: 17]

Answer:

Question	Answer	Marks
(a)	**M1** times are correct for all five experiments (20, 25, 42, 56, 95)	**1**
	M2 All times recorded in whole numbers of seconds only	**1**
(b)	**M1** y-axis scale is linear and points take up over half of space available	**1**
	M2 and M3 All points plotted correctly	**2**
	M4 best fit line	**1**
(c)	**M1** correct working shown at a concentration of 1.3 on graph	**1**
	M2 correct reading from their working shown on graph	**1**

Question	Answer	Marks
(d)(i)	**M1** 0.25	**1**
	M2 cm / s	**1**
(d)(ii)	Experiment 5	**1**
(e)	to check / verify / compare results / to get concordant results /	**1**
(f)(i)	**M1** both temperatures are correct (24.0, 46.5)	**1**
	M2 temperature change calculated correctly (22.5) and all temperatures and temperature change given to one dp	**1**
(f)(ii)	a change of temperature will change the rate of reaction	**1**
(f)(iii)	the polystyrene would prevent heat escaping	**1**
(f)(iv)	use a water bath (at room temperature / at starting temperature)	**1**