

Surname	Centre Number	Candidate Number
First name(s)		0



GCSE



S25-3410U30-1B

MONDAY, 6 JANUARY – FRIDAY, 21 FEBRUARY 2025

CHEMISTRY – Unit 3 (3410U30)

PRACTICAL ASSESSMENT

**INVESTIGATING THE RATE OF THE REACTION BETWEEN
CALCIUM CARBONATE AND HYDROCHLORIC ACID**

SECTION B

1 hour

For Examiner's use only		
	Maximum Mark	Mark Awarded
Section B	24	

ADDITIONAL MATERIALSA calculator and your Section **A** exam paper.**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The total number of marks available for this section of the task is 24.

The number of marks is given in brackets at the end of each question or part-question.

This task is in 2 sections, **A** and **B**. You will have completed Section **A** in a previous lesson.

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SECTION BAnswer **all** questions.

2. (a) (i) State the independent variable in this experiment. [1]

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- (ii) State the dependent variable in this experiment. [1]

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- (iii) Complete the table below by describing how the following variables were controlled. [2]

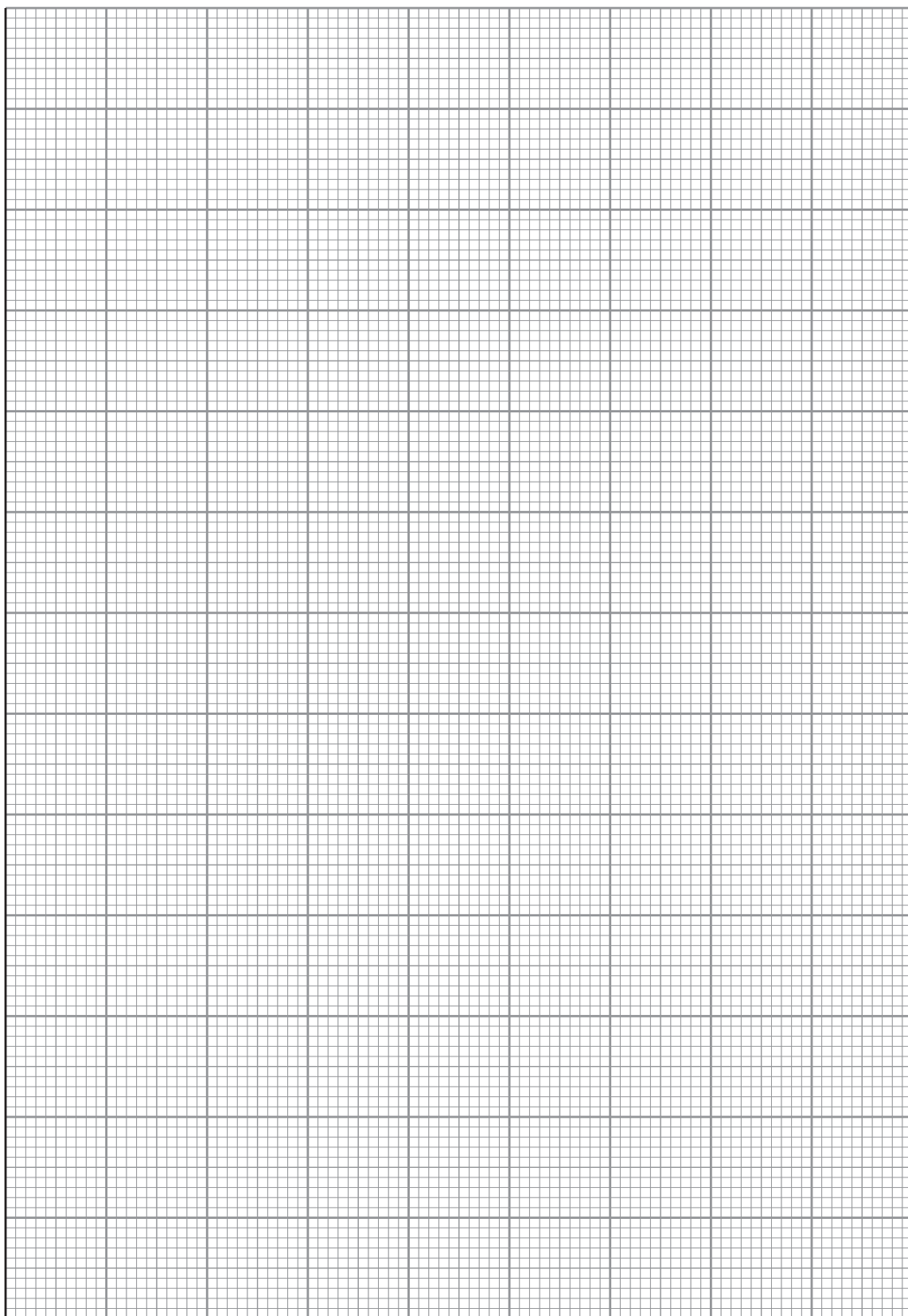
Controlled variable	How it was controlled
Surface area of calcium carbonate chippings	
Volume of dilute hydrochloric acid	

- (b) Use your results from Section **A** to draw a graph of the time taken to collect 100 cm^3 of gas (vertical axis) against the temperature (horizontal axis) on the grid opposite. [5]



Examiner
only

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- (c) (i) Use your graph to describe the relationship between the temperature and the time taken to collect 100 cm^3 of gas. [1]

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- (ii) Explain your answer to part (c)(i) using your knowledge of particle theory. [2]

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- (d) State what you could do to check the repeatability of your results. [1]

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- (e) The times recorded in Section **A** were longer than expected. Suggest **one** reason for this. [1]

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- (f) The same experiment was carried out by five groups of pupils. Their results are shown below.

Temperature (°C)	Time taken to collect 100 cm ³ of gas (s)					
	Group 1	Group 2	Group 3	Group 4	Group 5	Mean
20	90	92	90	57	88	90
30	40	42	42	22	44	38
40	23	22	22	12	21	22
50	15	14	15	7	16	15
60	12	11	12	5	11	12

- (i) Evaluate the reproducibility of their data.

[2]

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- (ii) Explain why the mean time for 30 °C should be 42 s.

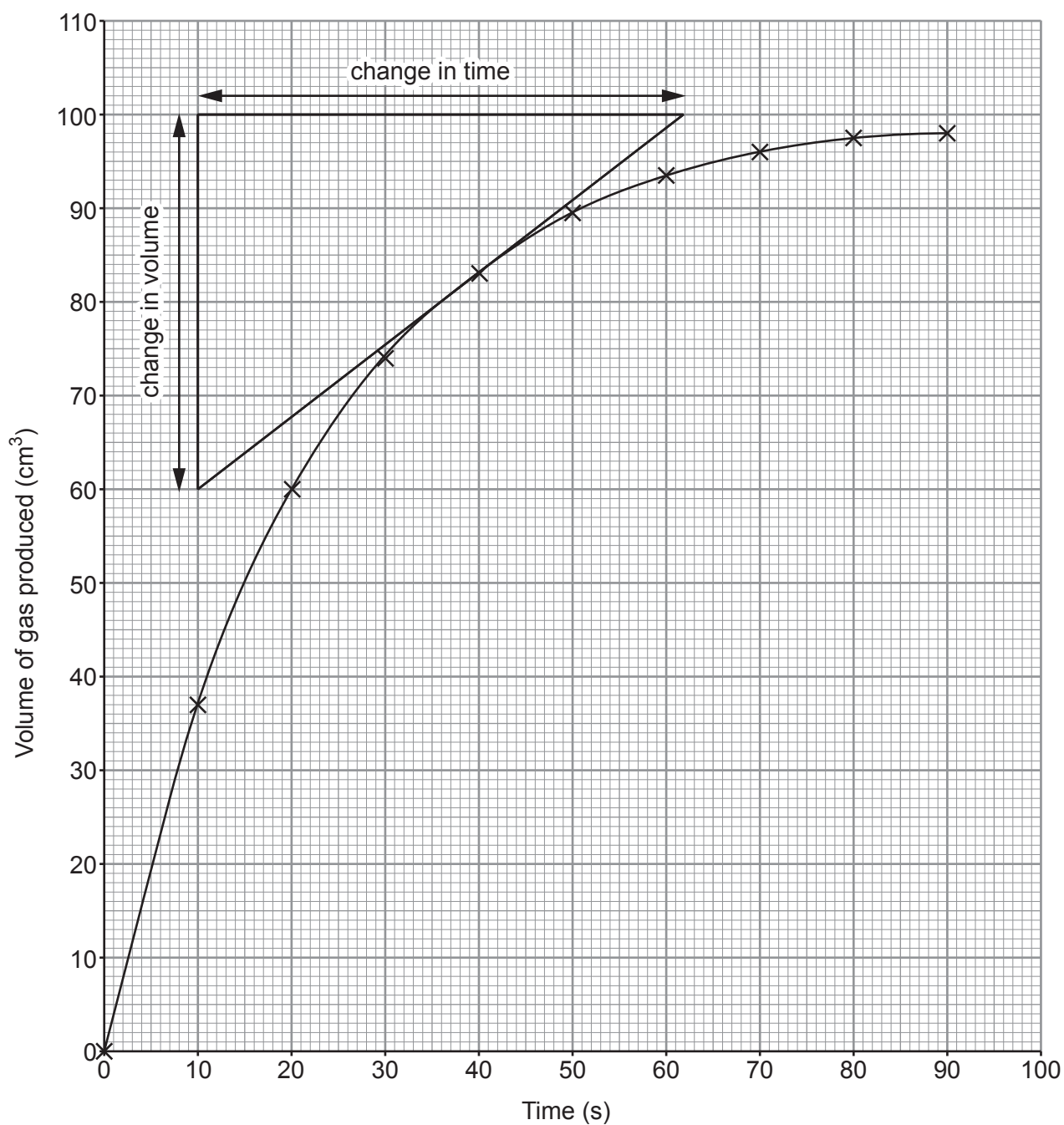
[1]

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- (iii) One of the groups wanted to investigate how the rate of the reaction at 20°C changes over time. They recorded the volume of gas produced at 10 second intervals for 90 seconds. Their results are shown in the graph below.



- I. Use information from the graph and the following equation to calculate the rate of the reaction at 40 s. [3]

$$\text{rate} = \frac{\text{change in volume}}{\text{change in time}}$$

rate = cm³/s

- II. State how the graph shows that the rate of the reaction decreases over time. [1]

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- (g) Plan an experiment to investigate the effect of concentration on the rate of the reaction between dilute hydrochloric acid and calcium carbonate chippings. You will not be expected to carry out this experiment. [3]

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24

END OF PAPER



