Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6975746068

CHEMISTRY **0620/61**

Paper 6 Alternative to Practical **October/November 2021**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

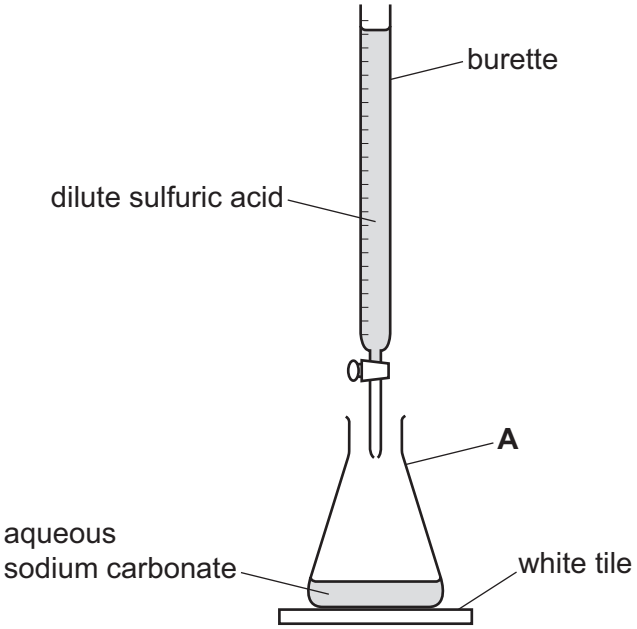
This document has **12** pages. Any blank pages are indicated.

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1 A student investigated the volume of dilute sulfuric acid that would react with 25.0 cm^3 of aqueous sodium carbonate.

- A burette was rinsed with water and then with dilute sulfuric acid.
- The burette was filled with dilute sulfuric acid. Some of the dilute sulfuric acid was run out of the burette so that the level of the dilute sulfuric acid was on the burette scale.
- 25.0 cm^3 of aqueous sodium carbonate was poured into the apparatus labelled **A** in the diagram.
- Five drops of methyl orange indicator were added to the aqueous sodium carbonate in **A**.
- The apparatus labelled **A** was placed on a white tile.
- The dilute sulfuric acid was added slowly to the 25.0 cm^3 of aqueous sodium carbonate until the colour of the methyl orange changed from yellow to orange.

The apparatus was arranged as shown in the diagram.



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

..... [1]

(b) State **one** safety precaution that should be taken when using dilute sulfuric acid.

..... [1]

(c) Give a reason why the white tile is used.

..... [1]

(d) Describe what should be done to the apparatus labelled **A** as the dilute sulfuric acid is added to the aqueous sodium carbonate.

..... [1]

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(e) State why the burette was rinsed with water and then with dilute sulfuric acid at the start of the experiment.

water .....

.....

dilute sulfuric acid .....

.....

[2]

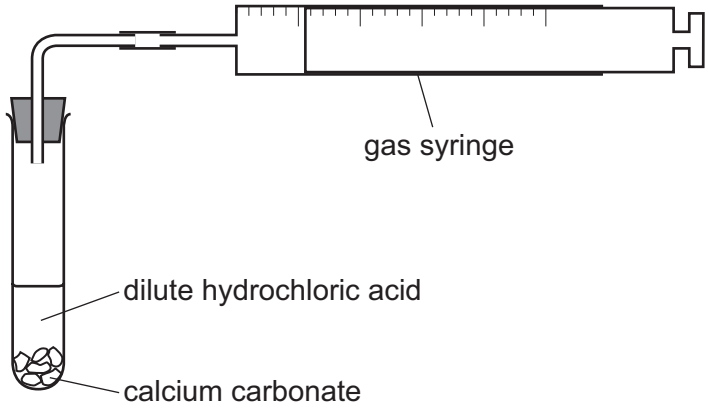
[Total: 6]

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[Turn over

2 A student investigated the rate of reaction between small lumps of calcium carbonate and dilute hydrochloric acid.

The experiment was done at two different temperatures using the apparatus shown in the diagram. All other conditions were kept the same.



Experiment 1

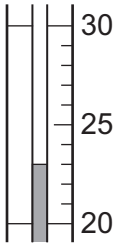
- Using a 50 cm^3 measuring cylinder, 25 cm^3 of dilute hydrochloric acid was poured into a boiling tube.
- The temperature of the dilute hydrochloric acid was measured using a thermometer.
- 10 g of lumps of calcium carbonate were added to the boiling tube, the bung replaced and the stop-watch started.
- The volume of gas collected in the gas syringe was measured every 50 seconds for 250 seconds.

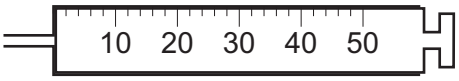
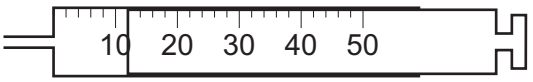
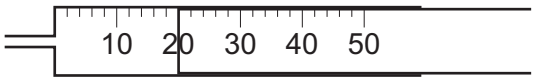
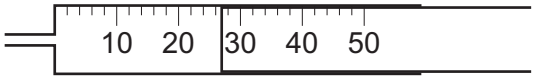
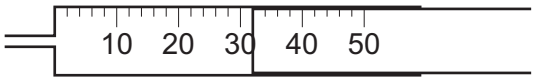
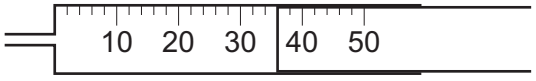
Experiment 2

- Using a 50 cm^3 measuring cylinder, 25 cm^3 of dilute hydrochloric acid was poured into a boiling tube.
- The dilute hydrochloric acid in the boiling tube was warmed using a Bunsen burner.
- The temperature of the dilute hydrochloric acid was measured using a thermometer.
- 10 g of lumps of calcium carbonate were added to the boiling tube, the bung replaced and the stop-watch started.
- The volume of gas collected in the gas syringe was measured every 50 seconds for 250 seconds.

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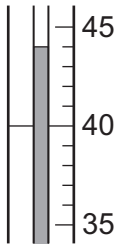
(a) Use the diagrams to complete the tables for Experiment 1.

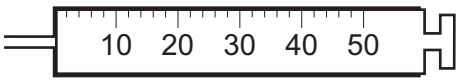
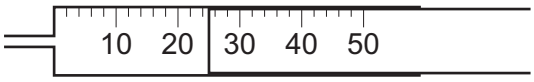
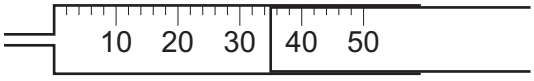
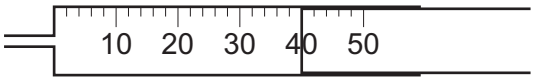
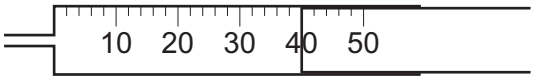
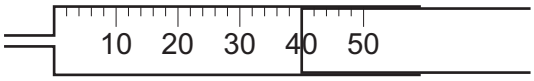
thermometer diagram	temperature of dilute hydrochloric acid / °C
	

time / s	gas syringe diagram	volume of gas collected / cm^3
0		
50		
100		
150		
200		
250		

[2]

(b) Use the diagrams to complete the tables for Experiment 2.

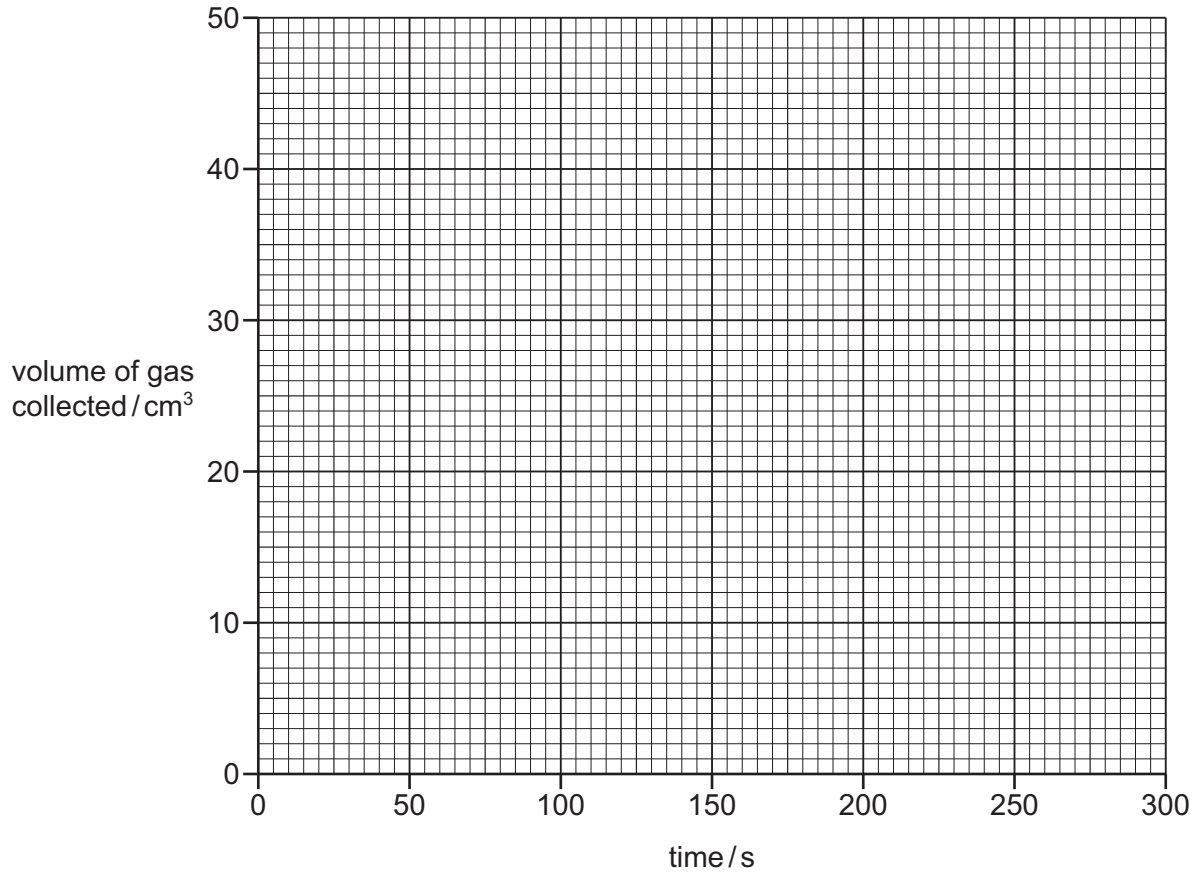
thermometer diagram	temperature of dilute hydrochloric acid / °C
	

time / s	gas syringe diagram	volume of gas collected / cm^3
0		
50		
100		
150		
200		
250		

[2]

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(c) Plot the results from Experiment 1 and Experiment 2 on the grid.
Draw a curve of best fit for each experiment. Label your curves.



[5]

(d) **From your graph**, deduce the volume of gas collected in Experiment 2 after 120 seconds.

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

..... cm^3
[2]

(e) Explain how the results show that the reaction in Experiment 2 has stopped.

.....

..... [1]

(f) Predict the volume of gas that would be collected in Experiment 1 after 800 seconds.
Explain your answer.

volume of gas collected after 800 seconds ..... cm^3

explanation .....

.....
[2]

(g) A student stated it would be an improvement to measure the volume of gas collected every 25 seconds.

Explain why this is an improvement.

.....

.....

..... [2]

(h) State **two** changes to the apparatus to improve the accuracy of the results obtained if the experiment is repeated using the same thermometer.

change 1 .....

.....

change 2 .....

.....

[2]

(i) Describe how the method used in Experiment 2 could be changed so that results can be obtained using dilute hydrochloric acid at 1 °C.

.....

..... [1]

[Total: 19]

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3 Solution **Y** and solution **Z** were analysed.
The following tests were done on the solutions.

tests on solution Y

tests	observations
Solution **Y** was divided into four portions in four test-tubes. **test 1** A strip of universal indicator paper was dipped into the first portion of solution **Y**.	the universal indicator paper turned blue
test 2 Aqueous copper(II) sulfate was added to the second portion of solution **Y**.	a blue precipitate formed
test 3 A flame test was done using the third portion of solution **Y**.	a red flame was seen
test 4 2 cm^3 of dilute sulfuric acid was added to the fourth portion of solution **Y**.	no visible change; the test-tube became slightly warmer

(a) Suggest the pH of solution **Y**.

..... [1]

(b) Identify solution **Y**.

.....

..... [2]

tests on solution Z

Solution **Z** was aqueous ammonium sulfite.

Complete all of the expected observations.

Solution **Z** was divided into three portions in two boiling tubes and a test-tube.

(c) 5 cm^3 of dilute hydrochloric acid was added to the first portion of solution **Z** in a boiling tube. The mixture was warmed and a piece of filter paper soaked in acidified aqueous potassium manganate(VII) held at the mouth of the boiling tube.

State the colour change of the acidified aqueous potassium manganate(VII).

from ..... to ..... [2]

(d) Name the gas being tested for in **(c)**.

..... [1]

(e) 5 cm^3 of aqueous sodium hydroxide was added to the second portion of solution **Z** in a boiling tube. The mixture was warmed and the gas given off was tested.

result of gas test .....

..... [1]

(f) Identify the gas given off in **(e)**.

..... [1]

(g) About 1 cm^3 of dilute hydrochloric acid followed by a few drops of aqueous barium nitrate were added to the third portion of solution **Z**.

observations ..... [1]

[Total: 9]

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4 Tartrazine is used as a yellow food colouring.

Plan an investigation to find out if a yellow sweet contains tartrazine. Explain how your results will tell you if the sweet contains tartrazine.

You have access to all normal laboratory materials, a yellow sweet and a sample of tartrazine.

You may draw a labelled diagram as part of your answer.

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..... [6]

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