Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6193842897

CHEMISTRY **0620/62**

Paper 6 Alternative to Practical **February/March 2020**

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 [ ].

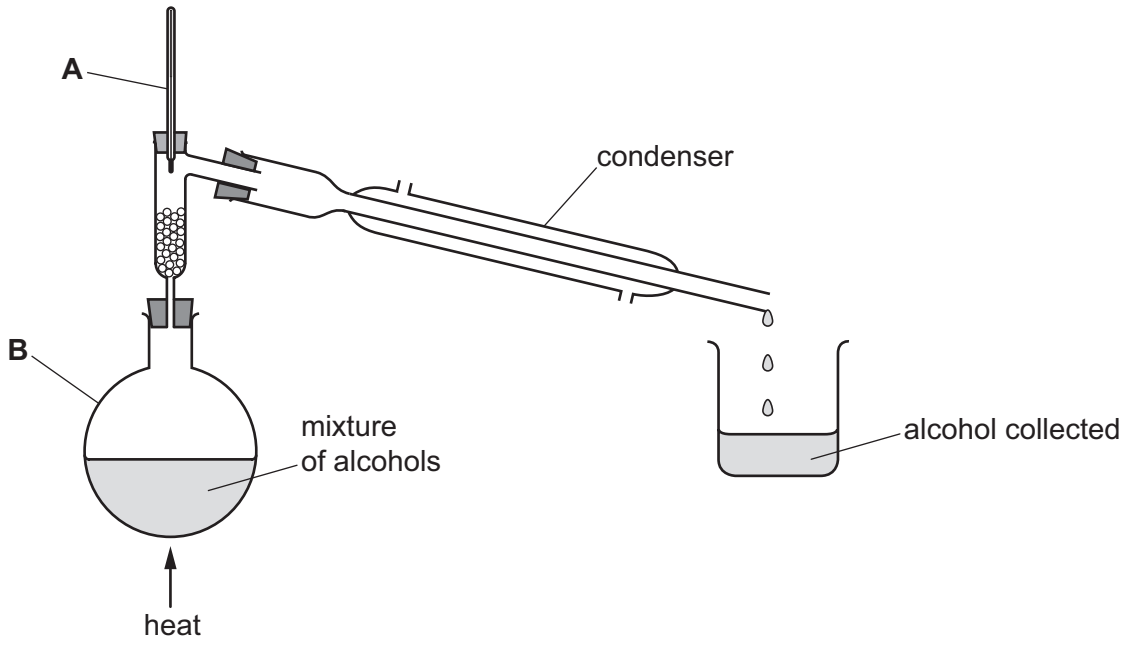
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1 The table gives the boiling points of four alcohols.

alcohol	boiling point / °C
methanol	65
ethanol	79
propan-1-ol	97
butan-1-ol	117

The apparatus shown can be used to separate a mixture of the four alcohols shown in the table.



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

A .....

B .....
[2]

(b) Add to the diagram **one** arrow to show where water enters the condenser. [1]

(c) **(i)** Why is it **not** safe to heat the mixture of alcohols with a Bunsen burner?

..... [1]

(ii) Suggest how the mixture of alcohols can be heated safely?

..... [1]

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(d) Describe how the condenser allows the alcohol to be collected as a liquid.

.....

..... [1]

(e) Which alcohol would be collected first?
Explain your answer.

alcohol collected first .....

explanation .....

.....
[2]

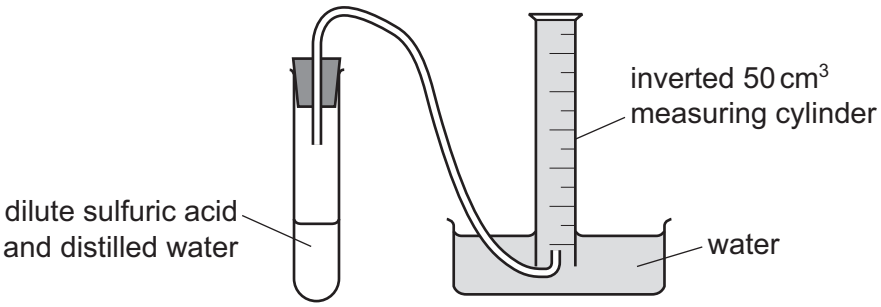
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2 A student investigated the time taken to collect 40 cm^3 of hydrogen gas when magnesium reacts with dilute sulfuric acid.

Five experiments were done using the apparatus shown.



Experiment 1

- Using a measuring cylinder, 8 cm^3 of dilute sulfuric acid was poured into the boiling tube.
- Using a second measuring cylinder, 12 cm^3 of distilled water was added to the acid in the boiling tube.
- The apparatus was set up as shown in the diagram, ensuring the inverted measuring cylinder was full of water.
- The bung was removed from the boiling tube.
- A coiled length of magnesium ribbon was added to the boiling tube, the bung was immediately replaced and a timer started.
- The time taken for 40 cm^3 of gas to be collected was measured.
- The student felt the outside of the boiling tube.

(a) (i) The student noticed that the boiling tube was warm.

What does this tell you about the type of reaction?

..... [1]

(ii) Describe **one** change that could be made to the apparatus to help keep the temperature of the contents of the boiling tube constant during the reaction.

..... [1]

Experiment 2

- The boiling tube was rinsed out with distilled water.
- Experiment 1 was repeated using 10 cm^3 of dilute sulfuric acid and 10 cm^3 of distilled water.

Experiment 3

- Experiment 2 was repeated using 12 cm^3 of dilute sulfuric acid and 8 cm^3 of distilled water.

Experiment 4

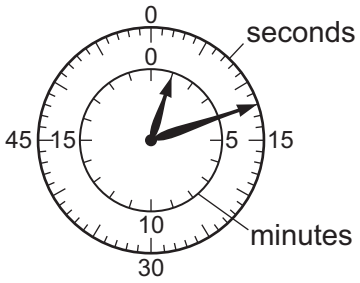
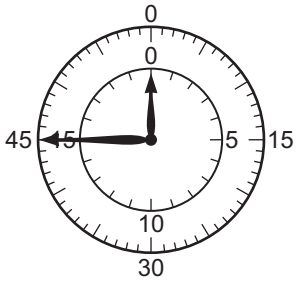
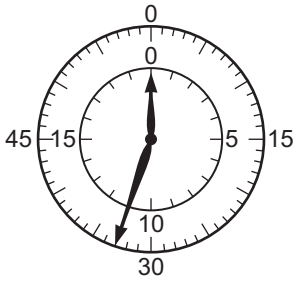
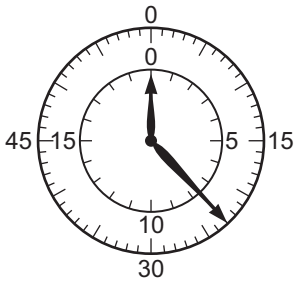
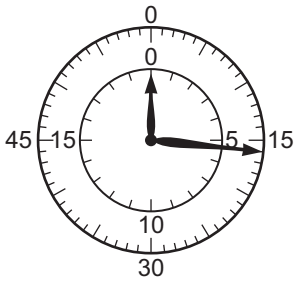
- Experiment 2 was repeated using 16 cm^3 of dilute sulfuric acid and 4 cm^3 of distilled water.

Experiment 5

- Experiment 2 was repeated using 20 cm^3 of dilute sulfuric acid and no distilled water.

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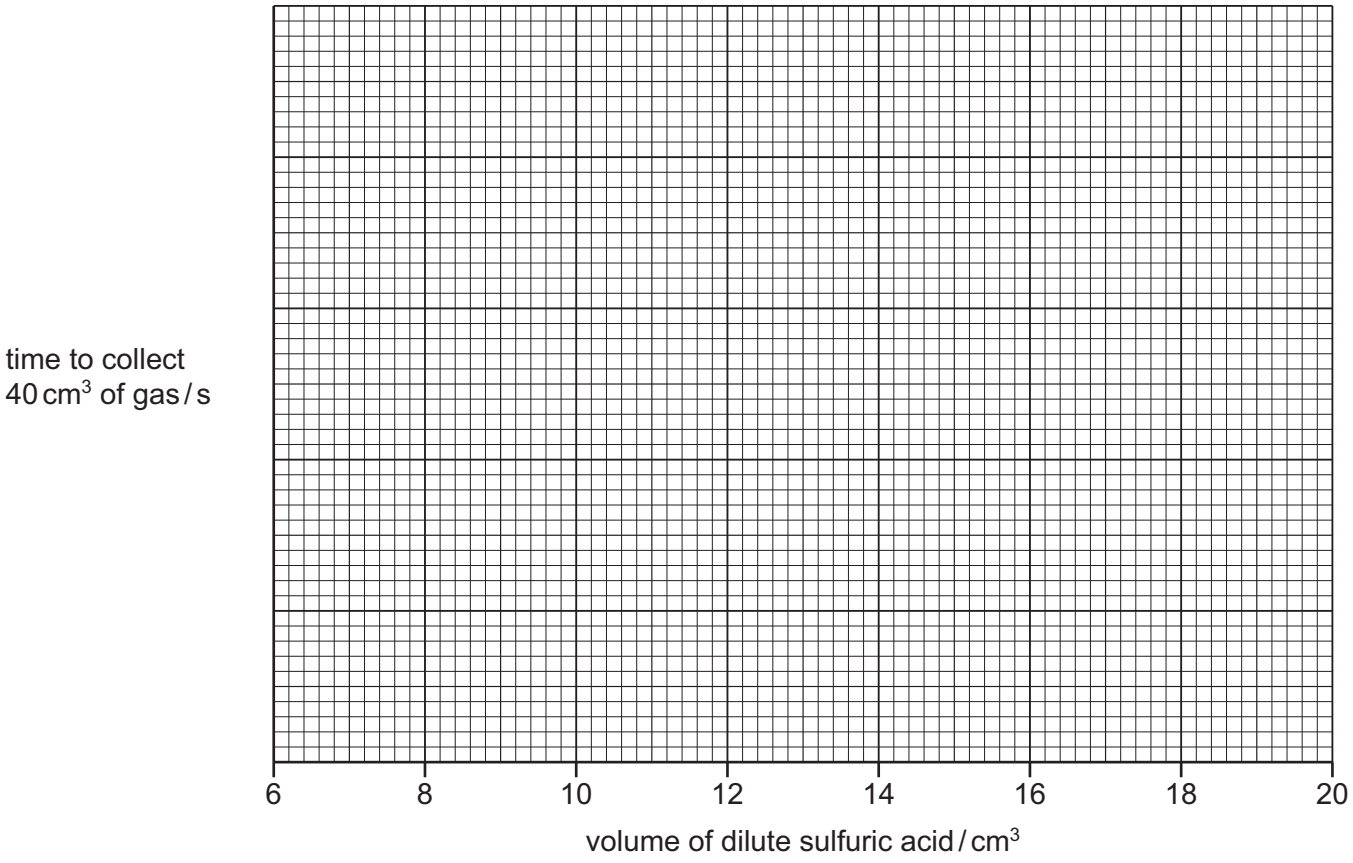
(b) Use the information in the description of the experiments and the timer diagrams to complete the table. Record the time in **seconds**.

experiment	volume of dilute sulfuric acid / cm^3	volume of distilled water / cm^3	timer diagram	time to collect 40 cm^3 of gas / s
1	8			
2	10			
3	12			
4	16			
5	20			

[4]

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(c) Add a suitable scale to the *y*-axis and plot the results from Experiments 1 to 5 on the grid. Draw a smooth line graph.



[4]

(d) (i) **From your graph**, deduce the time taken to collect 40 cm^3 of gas if the experiment was repeated using 9 cm^3 of dilute sulfuric acid.

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

..... s
[2]

(ii) What volume of distilled water would be needed if the experiment was repeated using 9 cm^3 of dilute sulfuric acid?

..... cm^3 [1]

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[Turn over

(e) The rate of reaction can be calculated using the equation shown.

$$\text{rate of reaction} = \frac{\text{volume of gas collected}}{\text{time taken to collect the gas}}$$

(i) Use this equation to calculate the rate of reaction in Experiment 1. Give the units for the rate of reaction you have calculated.

rate of reaction = ... units = ...
[2]

(ii) In which Experiment, 1, 2, 3, 4 or 5, was the rate of reaction greatest?

..... [1]

(f) Why would measuring the volume of dilute sulfuric acid with a burette rather than a measuring cylinder be an improvement?

.....

..... [1]

(g) The magnesium starts to react with the dilute sulfuric acid as soon as it is added.

(i) Why does this decrease the accuracy of the investigation?

..... [1]

(ii) Describe **one** improvement that you could make to overcome this problem.

.....

.....

..... [1]

[Total: 19]

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3 Solution **J** and solid **K** were analysed.

tests on solution J

tests	observations
Solution **J** was colourless. Solution **J** was divided into three portions in three test-tubes. **test 1** Universal indicator paper was dipped into the first portion of solution **J**.	the universal indicator paper turned red
test 2 A spatula measure of sodium carbonate was added to the second portion of solution **J**. The gas given off was tested.	effervescence was seen, the gas produced turned limewater milky
test 3 1 cm^3 of dilute nitric acid and a few drops of aqueous silver nitrate were added to the third portion of solution **J**.	a white precipitate formed

(a) Use the observation from **test 1** to suggest the pH of solution **J**.

pH = ... [1]

(b) Name the gas given off in **test 2**.

..... [1]

(c) Identify solution **J**.

.....

..... [2]

tests on solid K

Solid **K** was ammonium nitrate.

Complete the expected observations.

Solid **K** was dissolved in water to produce solution **K**. Solution **K** was divided into two equal portions.

(d) About 1 cm^3 of dilute nitric acid and a few drops of aqueous barium nitrate were added to the first portion of solution **K**.

observations ..... [1]

(e) 2 cm^3 of aqueous sodium hydroxide was added to the second portion of solution **K**. The mixture was warmed and the gas given off was tested.

observations .....

.....

..... [2]

[Total: 7]

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4 A black dye can be obtained from some plant roots.

Plan an investigation to determine how many different coloured substances are contained in a black dye obtained from plant roots.

You must include how the results you obtain will tell you how many different coloured substances are contained in the black dye.

You have access to plant roots and all normal laboratory apparatus.

.....

.....

.....

.....

.....

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.....

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.....

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..... [6]

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