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0620/63

May/June 2017

1 hour

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

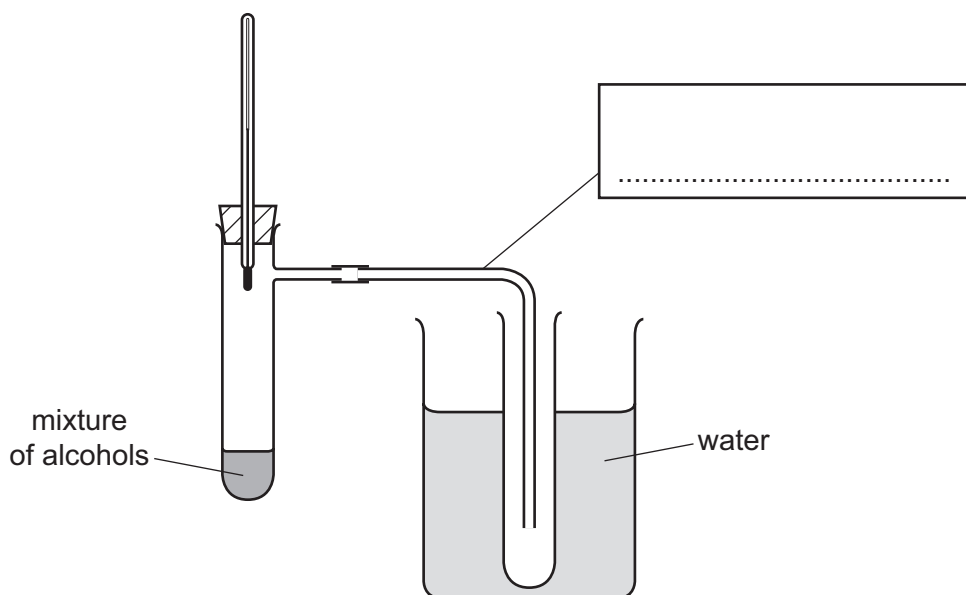
You may lose marks if you do not show your working or if you do not use appropriate units.

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

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of 8 printed pages.

- 1 A mixture of alcohols can be separated by fractional distillation. The apparatus shown was used to separate ethanol from the mixture.



(a) (i) Complete the box to identify the apparatus. [1]

(ii) Indicate with an arrow where heat is applied. [1]

(b) What is the purpose of the water?

.....
 [2]

(c) Why is the thermometer bulb placed as shown and **not** in the mixture of alcohols?

.....
 [1]

(d) Use the letter **E** to indicate on the diagram where ethanol would collect. [1]

(e) (i) Suggest a simple chemical test to show that the liquid collected is ethanol and **not** water.

..... [1]

(ii) Give a physical test to identify pure ethanol.

..... [1]

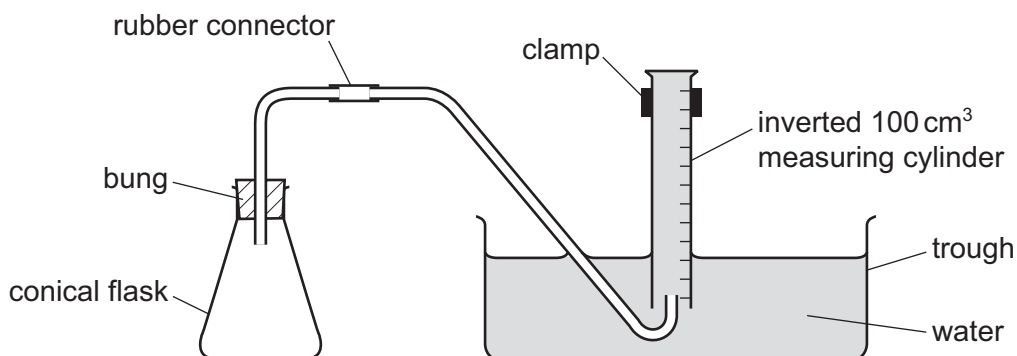
[Total: 8]

- 2 A student investigated the rate of reaction between magnesium ribbon and two different solutions of dilute sulfuric acid, solution **G** and solution **H**. The acid was in excess in both experiments.

Two experiments were carried out.

Experiment 1

- The apparatus was set up as shown in the diagram.

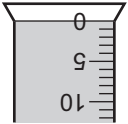
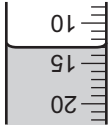
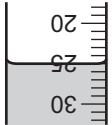
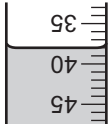
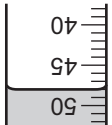
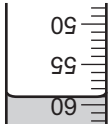
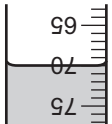
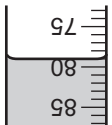
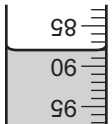
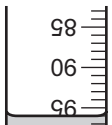


- Using a measuring cylinder, 50 cm³ of solution **G** were poured into the conical flask. A piece of magnesium ribbon was added to the conical flask and the bung replaced.
- The timer was started immediately and the total volume of gas collected in the measuring cylinder was measured every 20 seconds for 180 seconds (3 minutes).

Experiment 2

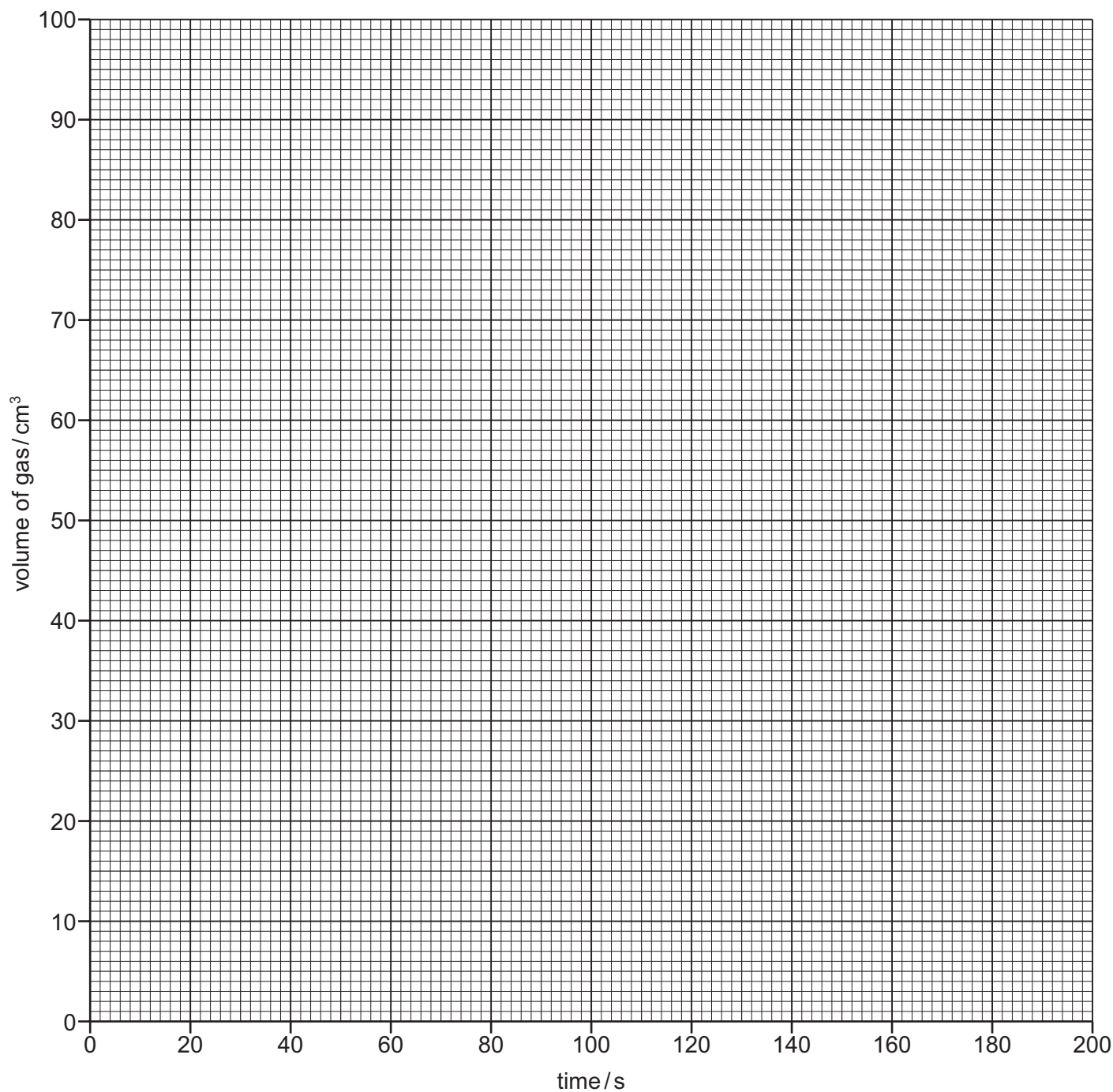
- Experiment 1 was repeated using 50 cm³ of solution **H** instead of solution **G**.

(a) Use the measuring cylinder diagrams to record the volumes of gas collected in Experiment 1.

time / s	Experiment 1		Experiment 2
	measuring cylinder diagram	volume of gas / cm ³	volume of gas / cm ³
0			0
20			8
40			14
60			21
80			27
100			33
120			39
140			45
160			50
180			55

[3]

- (b) Plot the results for Experiments 1 and 2 on the grid and draw **two** smooth line graphs. Clearly label your graphs.



[4]

- (c) Which experiment had the faster rate of reaction? Suggest a reason why the rate was faster in this experiment.

.....

..... [2]

- (d) The average rate of this reaction can be calculated using the equation shown.

$$\text{average rate} = \frac{\text{volume of gas/cm}^3}{\text{time taken/s}}$$

For Experiment 1, calculate the average rate of reaction for the first 30 seconds of the reaction. Include the units.

rate =

units =

[3]

- (e) Why, eventually, will no more gas be produced?

..... [1]

- (f) Suggest the effect on the rate of reaction of using the same mass of magnesium powder instead of magnesium ribbon. Explain your answer.

.....

.....

..... [2]

- (g) Give **one** advantage and **one** disadvantage of using a measuring cylinder to measure the volumes of solution **G** and solution **H**.

advantage

disadvantage

[2]

- (h) Suggest **one** improvement to these experiments.

.....

..... [1]

[Total: 18]

- 3 Two substances, solid **J** and solution **K**, were analysed. Solution **K** was hydrogen peroxide. Tests on each substance were carried out. The observations are shown.

tests	observations
tests on solid J Appearance of solid J .	black solid
test 1 Dilute hydrochloric acid was added to solid J . The mixture was heated and the gas given off was tested with damp litmus paper.	blue litmus turned white
tests on solution K Solution K was divided into two equal portions in two test-tubes. test 2 Iron(II) sulfate crystals were added to the first portion of the solution. The mixture was shaken and aqueous sodium hydroxide was added to the mixture.	red-brown precipitate formed
test 3 Solid J was added to the second portion of the solution. The gas given off was tested with a splint.	glowing splint relit solid J was unchanged

- (a) Name the gas given off in **test 1**.

..... [1]

- (b) (i) Name the precipitate formed in **test 2**.

..... [2]

- (ii) A new **test 2** was carried out. Iron(II) sulfate crystals were added to **water**, the mixture was shaken and then aqueous sodium hydroxide was added.

What would be observed?

..... [2]

(c) Name the gas given off in **test 3**.

..... [1]

(d) What conclusions can you draw about solid **J**?

.....

..... [2]

[Total: 8]

4 Cassiterite is a naturally occurring form of tin oxide.

Describe how you would

- obtain a sample of tin from a large lump of cassiterite in the laboratory,
- determine the percentage by mass of tin present in cassiterite.

Tin is similar in reactivity to iron.

Your answer should include any apparatus and chemicals used and the conditions required.

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..... [6]

[Total: 6]

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