Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

COMBINED SCIENCE **0653/52**

Paper 5 Practical Test **May/June 2017**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
Notes for Use in Qualitative Analysis for this paper are printed on page 12.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
Total	

This document consists of **10** printed pages and **2** blank pages.

CAMBRIDGE International Examinations

[Turn over

1 You are provided with a flower.

Carefully remove 2 petals.

(a) In the box below, make a **large** pencil drawing of the flower.

This should show all the flower parts including some petals.

[4]

(b) You are going to calculate the magnification of your drawing.

(i) Draw a straight line across your drawing from one edge to the other.

Measure the length of this line in millimetres to the nearest millimetre.

length = ... mm

Measure the same length of the same part on the real flower in millimetres to the nearest millimetre.

length = ... mm

[2]

(ii) Use your two measurements to calculate the magnification of your drawing.

Show your working in the space below.

magnification = ...[1]

(c) Flowers contain nectar.

Plan an investigation using two different flowers to find out which nectar contains more reducing sugar.

You should include details of how you will carry out the test and what observations will allow you to conclude which nectar contains more reducing sugar.

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.....

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.....

.....

.....[3]

2 You are going to investigate how the temperature of a reactant affects the rate of reaction between calcium carbonate and hydrochloric acid.

You are provided with marble chips (calcium carbonate) and hydrochloric acid.

(a) Set up the apparatus provided as shown in Fig. 2.1.

To obtain an inverted 100 cm^3 measuring cylinder full of water:

- fill the measuring cylinder with water
- place your finger or hand firmly over the open end of the cylinder so no water can run out
- invert and place this end under the water in the water container
- remove your hand and clamp the cylinder in place (note that a small amount of air in the measuring cylinder will not be a problem in this experiment)
- push the tubing of the delivery tube up into the cylinder a little way.

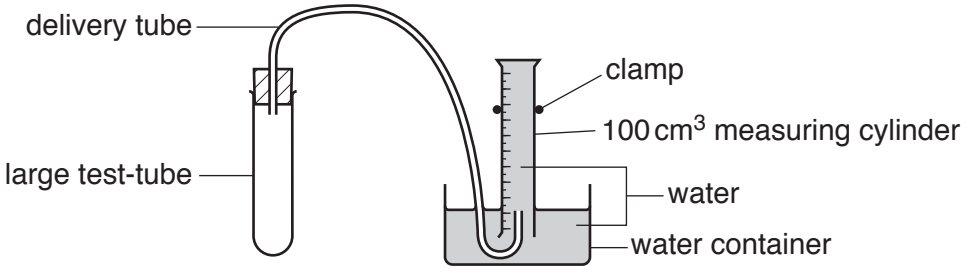

Fig. 2.1

(i) experiment 1

- Disconnect the large test-tube and use a measuring cylinder to place 20 cm^3 of hydrochloric acid into it.
- Measure the temperature of the acid in the large test-tube and record in Table 2.1 the temperature to the **nearest half degree** for **experiment 1**.
- Add ten marble chips to the acid.
- Connect the delivery tube to the large test-tube making sure that the tube goes up into the measuring cylinder as in Fig. 2.1.
- Start the stopclock.
- When **one minute** is shown on the stopclock read the volume V_1 of gas collected in the measuring cylinder.
- Record in Table 2.1 this volume V_1 for **experiment 1**.
- When **two minutes** is shown on the stopclock read the volume V_2 of gas collected in the measuring cylinder.
- Record in Table 2.1 this volume V_2 for **experiment 1**.

[2]

Table 2.1

experiment	temperature of acid / °C	volume of gas after **one minute** V_1 / cm^3	volume of gas after **two minutes** V_2 / cm^3	volume of gas produced in second minute V / cm^3
1				
2				
3				

(ii) experiment 2

- Pour the contents of the large test-tube into the beaker labelled waste.
- Rinse out the large test-tube with water.
- Refill the inverted measuring cylinder with water and replace the tube as in Fig. 2.1.
- Remove some water from the water container if it is close to overflowing.
- Using a measuring cylinder, place 20 cm^3 of hydrochloric acid into the large test-tube.
- Place the large test-tube containing the acid in a beaker of hot water.
- When the temperature of the acid in the large test-tube is about 10 °C above the temperature for **experiment 1**, record in Table 2.1 this temperature to the **nearest half degree** for **experiment 2**.
- Immediately remove the large test-tube from the beaker of hot water and add ten unused marble chips to the acid.
- Connect the delivery tube to the large test-tube making sure that the tube goes up into the measuring cylinder as in Fig. 2.1.
- Start the stopclock.
- When one minute is shown on the stopclock read the volume V_1 of gas collected in the measuring cylinder.
- Record in Table 2.1 this volume V_1 for **experiment 2**.
- When two minutes is shown on the stopclock read the volume V_2 of gas collected in the measuring cylinder.
- Record in Table 2.1 this volume V_2 for **experiment 2**.

[2]

(iii) experiment 3

Repeat **(a)(ii)**, increasing the temperature of the acid by a further 10 °C.

You may need to replace the hot water in the beaker. [2]

[Turn over

(b) **(i)** For each experiment calculate the volume *V* of gas produced during the second minute.

Record your values in Table 2.1.

[1]

(ii) Use your data to describe the relationship between the temperature of the acid and the rate of the reaction.

.....

.....[1]

(c) Suggest an alternative method for measuring the rate of reaction between marble chips and acid.

You may draw a labelled diagram but you must state what is being measured.

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.....

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.....[2]

Please turn over for Question 3.

3 You are going to find the density of water.

You are provided with a test-tube, a balance, a measuring cylinder and a beaker containing water.

(a) (i) Use the balance to measure the mass m of the test-tube to the nearest 0.1 g.

m = ... g [1]

(ii) Pour approximately 65 cm^3 of water from the beaker into the measuring cylinder.

Record the volume V_1 of water on the scale of the measuring cylinder.

V_1 = ... cm^3 [1]

(iii) Slowly and carefully lower the test-tube into the measuring cylinder until it floats, approximately vertically, as shown in Fig. 3.1. The test-tube should not touch the bottom of the measuring cylinder.

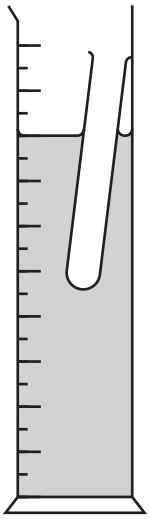

Fig. 3.1

Record the new volume V_2 of water on the scale of the measuring cylinder.

V_2 = ... cm^3 [2]

(iv) Use your volume values from **(a)(ii)** and **(a)(iii)** to calculate the volume V_3 of water displaced by the test-tube.

V_3 = ... cm^3 [1]

(v) Calculate the density d of the water using your values from **(a)(i)** and **(a)(iv)**, using the equation below. Include the unit in your answer.

$$d = \frac{m}{V_3}$$

d = ... unit ..... [2]

(b) (i) Suggest **two** possible sources of inaccuracy in this experiment.

1. .....

2. .....
[2]

(ii) State and explain the effect that **one** of the sources of inaccuracy you gave in **(b)(i)** would have on the calculated value of *d*.

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.....

.....[1]

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NOTES FOR USE IN QUALITATIVE ANALYSIS

Test for anions

anion	*test*	*test result*
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify with dilute nitric acid, then add aqueous barium nitrate	white ppt.

Test for aqueous cations

cation	*effect of aqueous sodium hydroxide*	*effect of aqueous ammonia*
ammonium (NH_4^+)	ammonia produced on warming	–
copper(II) (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess giving a colourless solution	white ppt., soluble in excess giving a colourless solution

Test for gases

gas	*test and test results*
ammonia (NH_3)	turns damp red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	‘pops’ with a lighted splint
oxygen (O_2)	relights a glowing splint