Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER							CANDIDATE NUMBER					

6685357076

COMBINED SCIENCE **0653/52**

Paper 5 Practical Test **October/November 2018**

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 8.

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 **8** printed pages.

DC (RW/CT) 155621/3

CAMBRIDGE International Examinations

1 You are going to investigate the nutrient content of two solutions, **A** and **B**.

(a) You are provided with Benedict's solution, biuret solution and iodine solution.

1. Add about 1 cm depth of solution **A** to each of three test-tubes.
2. Add the same depth of Benedict's solution to one of these test-tubes and place in a hot water-bath for at least 3 minutes. You may carry out steps 3 and 4 while you are waiting.
3. Add the same depth of biuret solution into the second test-tube.
4. Add a few drops of iodine solution to the final test-tube.

Record, in Table 1.1, your observations of the final colours for each of the three test-tubes. [3]

Table 1.1

solution	observation with Benedict's solution	observation with biuret solution	observation with iodine solution
A			
B			

(b) Using clean test-tubes repeat the procedure in **(a)** with solution **B** instead of solution **A**.

Record your observations in Table 1.1. [2]

(c) Use your observations in Table 1.1 to state the nutrients present in each solution.

Solution **A** contains ....

Solution **B** contains ....
[2]

(d) State and explain a safety precaution you used when carrying out the tests.

safety precaution ....

explanation ....

....
[1]

(e) Describe the method used to test a liquid for the presence of fat. Indicate the observation for a positive result.

method ....

....

....

observation for a positive result ....

....
[2]

2 Notes for use in Qualitative Analysis for this question are printed on page 8.

You are going to investigate the thermal decomposition of metal carbonates.

(a) **(i)**
- Add about 3 cm depth of limewater to a test-tube.
- Connect the bung of the delivery tube to the hard-glass test-tube containing copper carbonate.
- Place the delivery tube into the limewater, as shown in Fig. 2.1.

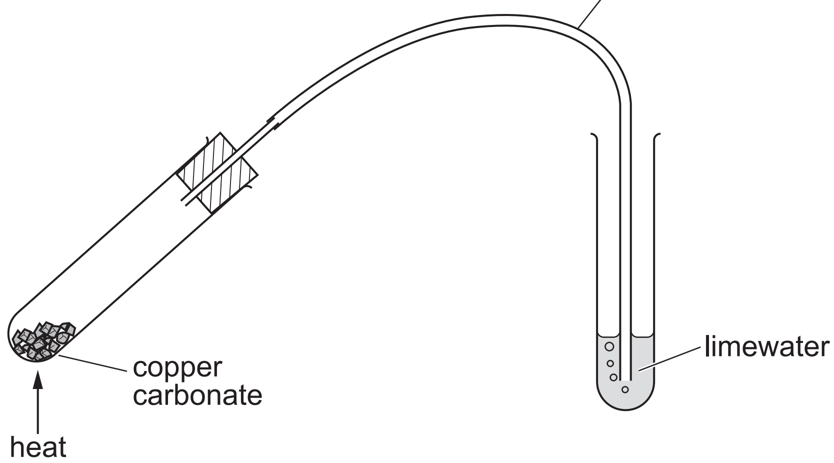

Fig. 2.1

- Heat the test-tube containing copper carbonate with a hot flame and start the stopclock.
- When the limewater becomes milky, stop the stopclock, **remove the delivery tube from the limewater** to avoid suck back and stop heating.

Record, in Table 2.1, the time **to the nearest second** as well as any colour change in the solid. [1]

Table 2.1

name of metal carbonate	time / s	colour change
copper carbonate		
magnesium carbonate		
zinc carbonate		

(ii) Repeat **(a)(i)** with the magnesium carbonate instead of copper carbonate.

Use fresh limewater.

Stop the stopclock when the limewater has the same milky colour as in **(a)(i)**. [1]

(iii) Repeat **(a)(ii)** with zinc carbonate instead of magnesium carbonate. [1]

(iv) Place the three metal carbonates in order of rate of turning limewater milky (speed of thermal decomposition).

1. .... fastest

2. .... ↓

3. .... slowest

[1]

(v) Name the gas produced by the thermal decomposition of a metal carbonate.

....[1]

(b) **(i)** Suggest two reasons why the results in this experiment may be inaccurate.

1. ....

....

2. ....

....

[2]

(ii) The rate of the gas production when metal carbonates are heated can be measured without the use of limewater.

Suggest an alternative method of measuring the rate of gas production.

Include a diagram to show what replaces the test-tube of limewater and state what should be measured.

....

....

....

[3]

3 You are going to investigate how the power produced in a resistance wire **XY** depends upon its length.

The circuit shown in Fig. 3.1 has been set up for you.

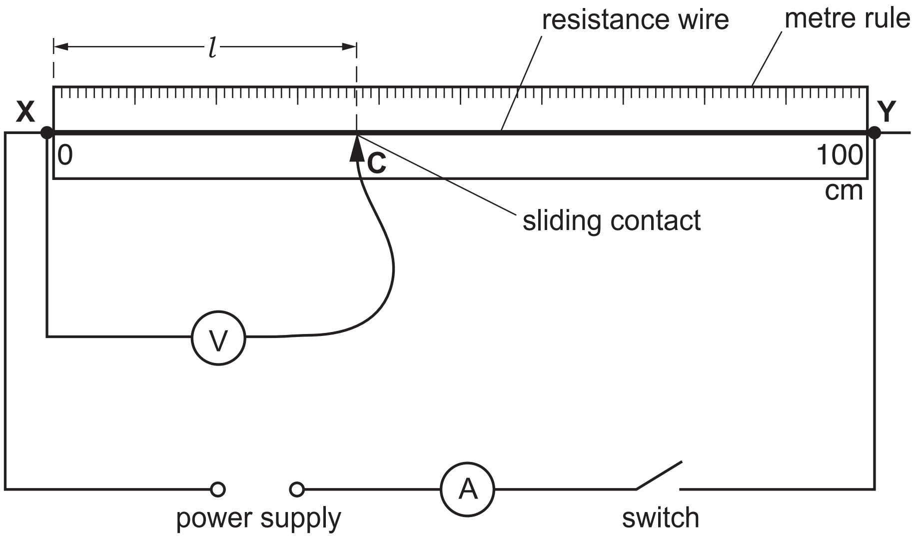

Fig. 3.1

(a) (i)
- Close the switch.
- Place the sliding contact **C** on the resistance wire at a distance of 10.0 cm from end **X**.

Record, in Table 3.1, the current I flowing through the wire. [1]

(ii) Record, in Table 3.1, the potential difference (p.d.) V across the wire.

- Open the switch. [1]

Table 3.1

length l/cm	current I/A	p.d. V/V	power P/W
10.0			
20.0			
40.0			
80.0			

(iii) Calculate the power P produced in the 10.0 cm length of the wire using the equation shown:

$$P = V \times I$$

Record P in Table 3.1. [1]

(iv) Repeat **(a)(i)**, **(a)(ii)** and **(a)(iii)** for values of l of 20.0 cm, 40.0 cm and 80.0 cm.

Record, in Table 3.1, your values of I, V and P. [4]

(v) State why it is important to open the switch between taking readings.

....

....[1]

(b) Use your results in Table 3.1 to suggest the relationship between the power P produced in the wire and its length l.

Explain your answer.

relationship ....

....

explanation ....

....

[2]

NOTES FOR USE IN QUALITATIVE ANALYSIS

Tests 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.

Tests 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

Tests 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