Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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|---|---|---|---|---|---|---|---|---|---|
| CANDIDATE NAME | | | | | | | | | |
| CENTRE NUMBER | | | | | | CANDIDATE NUMBER | | | | |

*3871685863*

**CO-ORDINATED SCIENCES** **0654/51**

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

**2 hours**

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 **11** printed pages and **1** blank page.


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CAMBRIDGE International Examinations

**1** You are going to investigate the nutrient content of banana, chickpea and egg white.

**(a) (i)** Complete the second row of Table 1.1 to show which nutrient the Benedict's test identifies. [1]

**(ii)** State in which of these tests a source of heat is required.

.....[1]

**(b)**
- Label three test-tubes **A**, **B** and **C**.
- Chop up the banana and place in the small beaker. Mash with a little distilled water until it can be poured.
- Divide the mixture evenly between the three test-tubes.

tests
- Carry out the Benedict's test with test-tube **A**.
- Carry out the biuret test with test-tube **B**.
- Carry out the iodine test with test-tube **C**.

**(i)** Complete the third row of Table 1.1 to show your observations. [1]

**(ii)** Rinse out the test-tubes **A**, **B** and **C** with distilled water or label three clean test-tubes **A**, **B** and **C**.

Add chickpea to a depth of approximately 2 cm to test-tubes **A**, **B** and **C**.

Repeat the tests and complete the fourth row of Table 1.1 to show your observations. [1]

**(iii)** Rinse out the test-tubes **A**, **B** and **C** with distilled water or label three clean test-tubes **A**, **B** and **C**.

Add egg white to a depth of approximately 2 cm to test-tubes **A**, **B** and **C**.

Repeat the tests and complete the fifth row of Table 1.1 to show your observations. [1]

**Table 1.1**

| | Benedict's test | biuret test | iodine test |
|---|---|---|---|
| nutrient tested for | | protein | starch |
| banana | | | |
| chickpea | | | |
| egg white | | | |

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**(c)** Use your observations in **(b)** to state the nutrient content of the foods you tested.

**(i)** Banana contains ..... . [1]

**(ii)** Chickpea contains ..... . [1]

**(iii)** Egg white contains ..... . [1]

**(d)** Plan an investigation using the Benedict's test to compare the nutrient content of two different brands of clear apple juice.

In your answer you should include how you will determine which brand contains the most of this nutrient and how to make a fair comparison.

.....

.....

.....

.....

.....

.....[4]

**(e)** Describe how you can test for the presence of fat in egg white.

method .....

.....

.....

observation for positive result .....

.....
[3]

**2** Notes for Use in Qualitative Analysis for this question are printed on page 12.

Solution **H** and solution **J** are each one of the following possible solutions.

| |
|---|
| ammonia solution |
| sodium hydroxide solution |
| hydrochloric acid |
| sulfuric acid |
| barium nitrate solution |
| silver nitrate solution |

**(a) (i)** Test solution **H** with both red and blue litmus papers. Record your observations in Table 2.1.

Test solution **J** with both red and blue litmus papers. Record your observations in Table 2.1.

**Table 2.1**

| | solution **H** | solution **J** |
|---|---|---|
| red litmus paper | | |
| blue litmus paper | | |

[2]

**(ii)** Using the observations in Table 2.1, choose from the list of possible solutions the **two** possible identities for each of solutions **H** and **J**.

solution **H** could be ..... or

.....

solution **J** could be ..... or

.....

[2]

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**(b)** You are provided with copper sulfate solution for use in **(b)(ii)**.

**(i)** Describe clearly how copper sulfate solution can be made using only copper(II) oxide and dilute sulfuric acid.

.....

.....

.....

.....

.....[3]

**(ii)**
- Place solution **H** in a test-tube to a depth of 2 cm.
- Slowly add copper sulfate solution until the test-tube is almost full.
- Record your observations in Table 2.2.
- Filter the mixture and record in Table 2.2 the colour of any residue.

Repeat this procedure with solution **J**.

**Table 2.2**

| | solution **H** | solution **J** |
|---|---|---|
| observations on slowly adding copper sulfate solution | | |
| colour of any residue | | |

[3]

**(iii)** Use **(a)(ii)** and your observations in Table 2.2 to identify solutions **H** and **J**.

solution **H** is .....

solution **J** is .....
[2]

**(c)** A student suggests that iron(III) sulfate may be used in **(b)(ii)** instead of copper sulfate to identify solutions **H** and **J**.

Explain in detail why the student is only partially correct.

.....

.....

.....

.....

.....[3]

**Please turn over for Question 3.**

**3** You are going to investigate how the resistance of a metal wire depends upon its length.

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

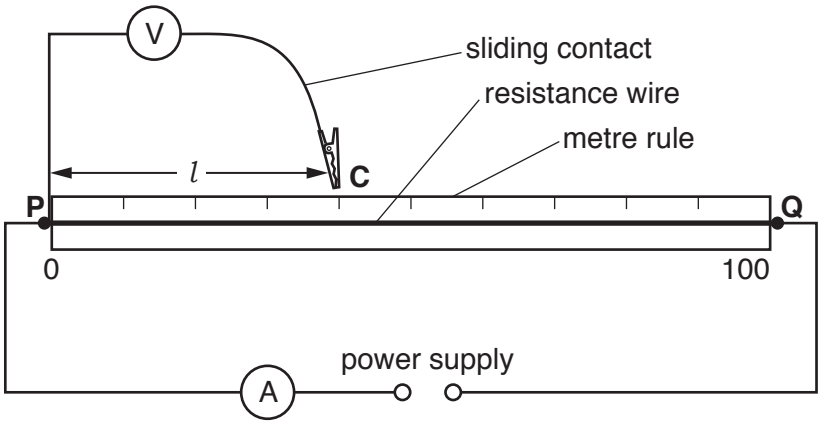


**Fig. 3.1**

**(a) (i) Procedure**

- Connect the crocodile clip **C** to the resistance wire **PQ** at a length $l$ = 20.0 cm from end **P**.
- Switch on the circuit.
- Record in Table 3.1 the current $I$ flowing through the wire and the potential difference $V$.
- Switch off the circuit.

**Table 3.1**

| length $l$/cm | current $I$/A | potential difference $V$/V | resistance $R$/Ω |
|---|---|---|---|
| 20.0 | | | |
| 35.0 | | | |
| 50.0 | | | |
| 65.0 | | | |
| 80.0 | | | |
| 95.0 | | | |

[1]

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**(ii)** Repeat the procedure **(a)(i)** for values of $l$ = 35.0 cm, 50.0 cm, 65.0 cm, 80.0 cm and 95.0 cm. [3]

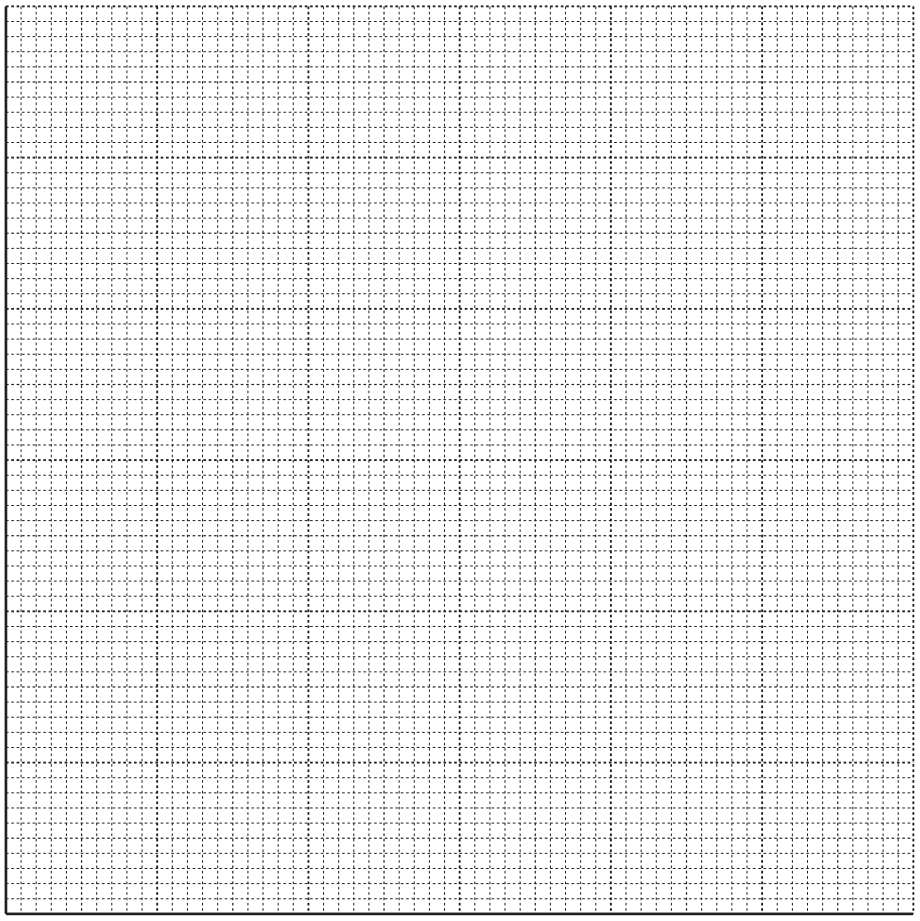
**(iii)** Calculate the resistance $R$ for each length of wire using the equation shown.

$$R = \frac{V}{I}$$

Record, in Table 3.1, your values of $R$. [1]

**(b)** Use the results in Table 3.1 to plot a graph of $R$ (vertical axis) against $l$.

Start both axes of your graph from the origin (0, 0). Draw the best-fit straight line.




[3]

**(c) (i)** Extend your line to predict the value of resistance $R$ at length $l$ = 110.0 cm.

$R$ = ..... Ω [1]

**(ii)** Suggest the relationship between the length of the wire and its resistance.

relationship .....

.....[1]

**(d)** The gradient of the line gives the resistance per unit length of the wire.

**(i)** Calculate the gradient of your line.

Show all working and indicate on your graph the values you chose to enable the gradient to be calculated.

gradient = ..... Ω / cm [2]

**(ii)** Predict the resistance of a length of 3.4 m of the same wire.

Show your working.

resistance = ..... Ω [1]

**(e)** Give **one** possible source of inaccuracy in carrying out this experiment and the precaution you took to minimise it.

source of inaccuracy .....

precaution .....

.....
[2]

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## 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 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 |

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