



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

CANDIDATE  
NAME

CENTRE  
NUMBER

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**CO-ORDINATED SCIENCES**

**0654/52**

Paper 5 Practical Test

**October/November 2015**

**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	
<b>1</b>	
<b>2</b>	
<b>3</b>	
<b>Total</b>	

This document consists of **11** printed pages and **1** blank page.

- 1 You are going to carry out some tests to determine the food groups present in rice and milk. You are provided with Benedict's reagent, biuret reagent and iodine solution.

**Before organising your work, read through parts (a), (b) and (c).**

- (a) Complete Table 1.1 to show which food group each test identifies. [3]

**Table 1.1**

test	food group identified
Benedict's	
biuret	
iodine	

- (b)
- Label three test-tubes **A**, **B** and **C**.
  - Place about 1 cm depth of milk in each test-tube.
  - Carry out the Benedict's test on the contents of test-tube **A**. Record your observations in Table 1.2.
  - Repeat the procedure using test-tubes **B** and **C** for the biuret test and iodine test, recording your observations in Table 1.2. [2]

**Table 1.2**

**Tests on milk**

test	observations
Benedict's	
biuret	
iodine	

- (c) • Label another three test-tubes **A**, **B** and **C**. (If you are re-using the test-tubes, rinse them out at this stage.)
- Place about 10 grains of rice in each test-tube.
  - The test-tubes should not be shaken during the test. Look for a colour forming around the grains.
  - Carry out the Benedict's test on the contents of test-tube **A**. Record your observations in Table 1.3.
  - Repeat the procedure using test-tubes **B** and **C** for the biuret test and iodine test, recording your observations in Table 1.3. [2]

Table 1.3

## Tests on rice

test	observations
Benedict's	
biuret	
iodine	

- (d) Use your results from Tables 1.2 and 1.3 to identify which food groups are present in the milk and rice.

Milk contains .....

Rice contains .....

[4]

- (e) (i) Describe how you can test for the presence of fats in a food.

.....  
 ....., [2]

- (ii) State what is observed if the result of the test in (e)(i) is positive.

..... [1]

- (iii) Suggest why the test in (e)(i) may be difficult to carry out on milk.

..... [1]

2 Solid **P** is a calcium salt. You are going to carry out tests on solid **P** and identify some products of its reactions.

(a) • **Remove the stopper** from the hard glass test-tube containing solid **P** for (a).

- Heat strongly for 2 minutes and hold a lighted splint at the mouth of the test-tube while heating.
- Leave to cool and keep the remaining solid for testing in (e). This is solid **R**.
- Record your observations.

observations .....

.....

..... [2]

(b) • Place half a spatula full of solid **P** for (b) and (c) in a test-tube and add about 5 cm<sup>3</sup> nitric acid. Gently heat the test-tube and hold pieces of damp red and blue litmus paper in the mouth of the test-tube, being careful not to touch the sides of the test-tube with the paper.

- Stop heating if the mixture starts to boil.
- Record your observations and conclusions.

observations .....

.....

.....

conclusions .....

.....

..... [4]

- (c) • Make a solution of half a spatula full of **P** for (b) and (c) in distilled water in a beaker. If necessary warm the mixture to completely dissolve the solid.
- To about 5 cm<sup>3</sup> of this solution of **P** for (b) and (c), add an equal volume of barium chloride solution.
  - Record your observations and conclusions.

observations .....

.....

conclusions .....

..... [2]

- (d) The reaction between **P** for (b) and (c) and nitric acid in (b) produces two compounds. These are a different calcium salt and compound **Q**.

You are provided with a solution of **Q** in distilled water.

- (i) Test some of solution **Q** with red and blue litmus papers.

Record your observations.

observations .....

..... [1]

- (ii) To 5 cm<sup>3</sup> of solution **Q**, add a spatula full of calcium carbonate powder.

Record your observations.

observations .....

..... [1]

- (iii) The hydrochloric acid provided has the same concentration as solution **Q**.

To 5 cm<sup>3</sup> of this hydrochloric acid add a spatula full of calcium carbonate powder.

Using your observations, compare the speed of this reaction with that seen in (d)(ii).

.....

..... [1]

- (iv) Using your results in (d)(i), (ii) and (iii), make conclusions about the properties of compound **Q**.

conclusions .....

..... [1]

- (e) (i) When the remaining solid from (a), compound **R**, has cooled, add hydrochloric acid and test any gas produced by passing it through limewater.

Record your observations.

observations .....

.....

..... [2]

- (ii) Suggest an identity for compound **R**.

compound **R** is ..... [1]

**Please turn over for Question 3.**

3 You are going to measure the resistance of a power source.

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

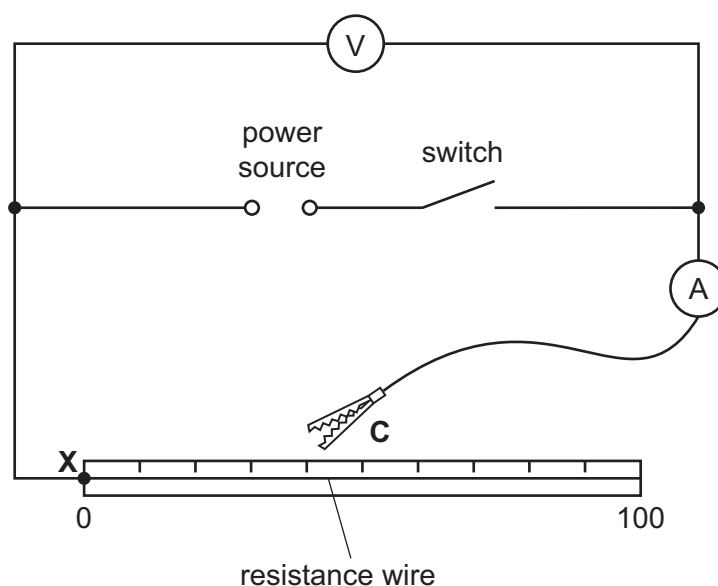


Fig. 3.1

- (a) (i) Close the switch and connect the crocodile clip **C** to the resistance wire at a distance  $d$  of 15.0 cm from end **X**. Record in Table 3.1 the current  $I$  flowing through the wire and the potential difference  $V$ .

Switch off the circuit.

[2]

Table 3.1

distance $d$ /cm	current $I$ / .....	potential difference $V$ / .....
15.0		
20.0		
25.0		
40.0		
60.0		
100.0		

- (ii) In Table 3.1 insert the units for current and potential difference.

[1]

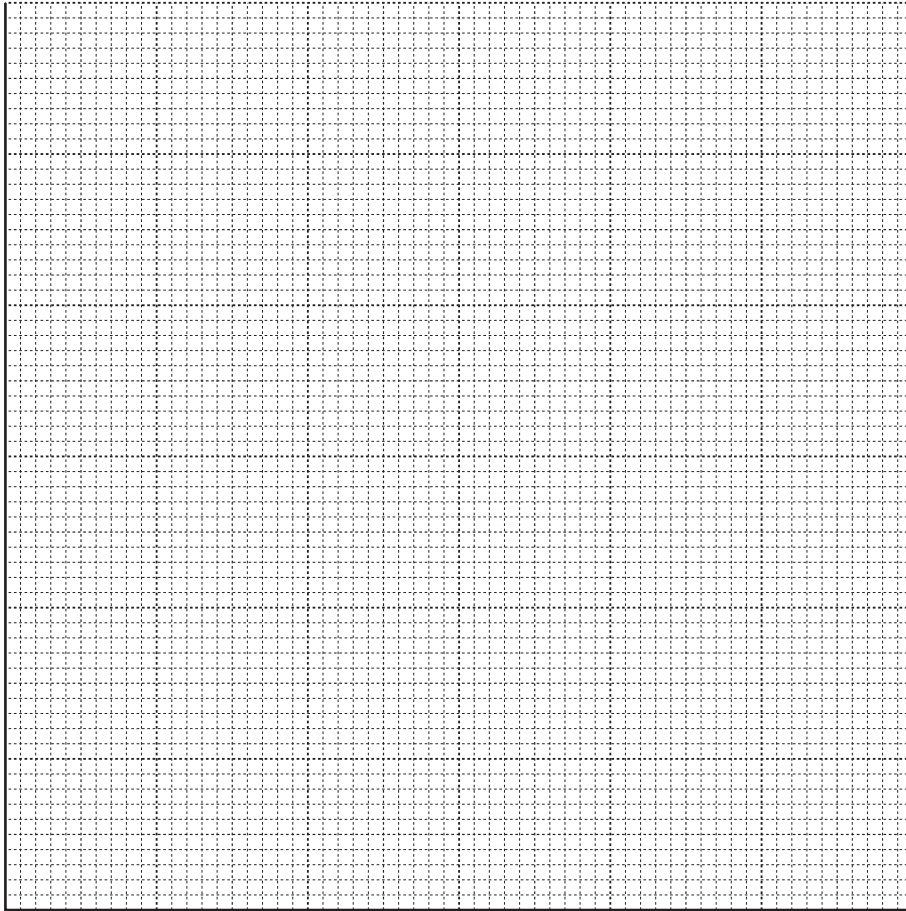
- (iii) Repeat (a)(i) for values of  $d$  of 20.0 cm, 25.0 cm, 40.0 cm, 60.0 cm and 100.0 cm.

Record in Table 3.1 your values of  $I$  and  $V$  for each  $d$ . Remember to switch off between readings.

[3]



- (b) Plot a graph of  $V$  (vertical axis) against  $I$ . Draw the best-fit straight line. You do not need to start your graph at  $(0, 0)$ .



[4]

- (c) 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 = ..... [2]

- (d) The positive value of the gradient of your line is equal to the resistance of the power source. Write down the resistance of the power source to an appropriate number of significant figures.

resistance of power source = .....  $\Omega$  [1]

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

source of inaccuracy .....

precaution .....

....., [2]



## NOTES FOR USE IN QUALITATIVE ANALYSIS

## Test for anions

<i>anion</i>	<i>test</i>	<i>test result</i>
carbonate ( $\text{CO}_3^{2-}$ )	add dilute acid	effervescence, carbon dioxide produced
chloride ( $\text{Cl}^-$ ) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
nitrate ( $\text{NO}_3^-$ ) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulfate ( $\text{SO}_4^{2-}$ ) [in solution]	acidify then add aqueous barium chloride <i>or</i> aqueous barium nitrate	white ppt.

## Test for aqueous cations

<i>cation</i>	<i>effect of aqueous sodium hydroxide</i>	<i>effect of aqueous ammonia</i>
ammonium ( $\text{NH}_4^+$ )	ammonia produced on warming	-
copper(II) ( $\text{Cu}^{2+}$ )	light blue ppt., insoluble in excess	light blue ppt., soluble in excess giving a dark blue solution
iron(II) ( $\text{Fe}^{2+}$ )	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) ( $\text{Fe}^{3+}$ )	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc ( $\text{Zn}^{2+}$ )	white ppt., soluble in excess giving a colourless solution	white ppt., soluble in excess giving a colourless solution

## Test for gases

<i>gas</i>	<i>test and test results</i>
ammonia ( $\text{NH}_3$ )	turns damp red litmus paper blue
carbon dioxide ( $\text{CO}_2$ )	turns limewater milky
chlorine ( $\text{Cl}_2$ )	bleaches damp litmus paper
hydrogen ( $\text{H}_2$ )	“pops” with a lighted splint
oxygen ( $\text{O}_2$ )	relights a glowing splint

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