Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

9183133374

COMBINED SCIENCE **0653/52**

Paper 5 Practical Test **February/March 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.

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CAMBRIDGE International Examinations

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

(a) • Label three test-tubes **C**, **D** and **E**.

• Stir solution **A** well and add to a depth of about 2 cm in each test-tube.

• Add approximately the same amount of Benedict's solution to test-tube **C** and use the stirring rod to mix well.

• Place in a hot water-bath for a few minutes.

• Clean the stirring rod and continue with the rest of part **(a)** while you are waiting.

• Add approximately the same amount of biuret solution to test-tube **D** and mix well.

• Add a few drops of iodine solution to test-tube **E** and mix well.

Record your observations in Table 1.1.

• Repeat the procedure above for solution **B**.

Table 1.1

solution	Benedict's solution (tube **C**)	biuret solution (tube **D**)	iodine solution (tube **E**)
colour obtained with solution **A**			
colour obtained with solution **B**			

[3]

(b) Use your observations to identify the nutrients present in solutions **A** and **B**.

Solution **A** contains ....

Solution **B** contains ....
[3]

(c) Suggest and explain a safety precaution you should have taken when carrying out your experiment.

....[1]

(d) Describe how you would test for the presence of fat in cooking oil.

You should include the following in your answer:

- what you will do
- the reagents you will use
- any safety precautions you will take
- the observations you will make that indicate the presence of fat

....

....

....

....

....

.... [3]

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

Solid **H** is a mixture of a metal oxide and a salt. You are going to carry out tests to identify the metal oxide and the salt.

(a)
- Add the sample of **H** to about 15 cm^3 distilled water in a large test-tube.
- Stir the mixture.
- Carefully **warm** the mixture and stir again.
- Filter the mixture keeping both the filtrate and the residue for **(b)** and **(c)**.

Describe the appearance of the filtrate and the residue.

filtrate ....

residue ....
[1]

(b) **(i)** Place about 2 cm^3 of the filtrate from **(a)** in a test-tube and add an equal volume of dilute hydrochloric acid.

Record your observations and make a conclusion about the anion.

observations ....

conclusion ....
[1]

(ii) Place another 2 cm^3 of the filtrate from **(a)** in a clean test-tube and add an equal volume of dilute nitric acid followed by a few drops of silver nitrate solution.

Record your observations and make a conclusion about the anion.

observations ....

conclusion ....
[2]

(iii) Using the remainder of the filtrate from **(a)**, plan and carry out tests to identify the cation in the filtrate.

Record in Table 2.1 your tests, observations and identity of the cation.
You do not have to use all of the boxes in the table.

Table 2.1

test	observations	identity of cation

[3]

(c) Place about 10 cm^3 dilute nitric acid in a large test-tube and warm until it is very hot but **do not boil**.

Pour the hot nitric acid onto the residue in its filter paper and funnel from **(a)**. Collect the filtrate produced in another large test-tube.

To this filtrate add ammonia solution slowly until it is in excess.

(i) Record your observations and identify the cation and hence the metal oxide.

observations ....

....

cation ....

metal oxide .... [2]

(ii) Suggest why hot nitric acid is used rather than cold nitric acid.

....

....[1]

Please turn over for Question 3.

3 You are going to investigate the resistance of lamps connected in series and in parallel.

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

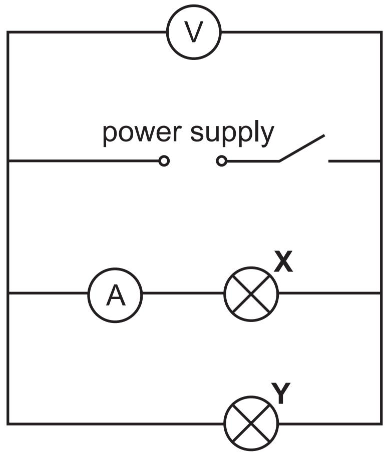

Fig. 3.1

(a) Switch on the circuit.

Record in Table 3.1 the potential difference V across the lamps and the current I flowing through lamp **X**. Switch off the circuit. [2]

Table 3.1

	potential difference V /	current I /	resistance R / ......
X			
Y			

Rearrange the circuit so that the ammeter is now connected to measure the current flowing through lamp **Y**.

(b) Switch on the circuit.

Record in Table 3.1 the potential difference V across the lamps and the current I flowing through lamp **Y**. Switch off the circuit. [1]

(c) **(i)** Use the equation below to calculate the resistance of each lamp.

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

Record in Table 3.1 your results.

[1]

(ii) Complete the column headings in Table 3.1 by adding the unit for each quantity. [1]

(iii) Calculate the sum of the resistances of lamps **X** and **Y**, R_P, by adding your two values together.

R_P = ...[1]

Rearrange the circuit so that both lamps are connected together in series with the ammeter. **Do not** change the position of the voltmeter.

(d) **(i)** Draw the new circuit diagram of the lamps connected in series.

[1]

(ii) Record the current I through the lamps and the potential difference V across them.

I = ...

V = ...
[1]

(iii) Calculate the combined resistance R_S of the two lamps in series.

R_S = ...[1]

(e) A student suggests that the value of R_P should be the same as the value of R_S.

State whether your results support this suggestion and justify your statement with reference to your results.

statement ....

justification ....
[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