Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

6687335766

CO-ORDINATED SCIENCES **0654/52**

Paper 5 Practical Test **May/June 2016**

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 **10** printed pages and **2** blank pages.

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CAMBRIDGE International Examinations

1 You are going to investigate the food content of peas and sweetcorn.

(a) **(i)** Complete the second **row** in Table 1.1 to show the food group that can be identified by each of the tests. [2]

(ii) **Procedure**

- Label three test-tubes **A**, **B** and **C**.
- Remove the outer skin (testa) from each of the 15 peas provided.
- Gently crush five peas in a beaker using the glass stirring rod and transfer to one of the test-tubes.
- Repeat this two more times so that each test-tube contains five crushed peas.
- Add Benedict's solution to a depth of approximately 2 cm to test-tube **A**. Using a clean stirring rod, mix well.
- Place in a hot water-bath for a few minutes. Continue with the rest of part **(a)** while you are waiting.
- Add biuret solution to a depth of approximately 2 cm to test-tube **B**. Using a clean stirring rod, mix well.
- Add a few drops of iodine solution to test-tube **C**. Using a clean stirring rod, mix well.
- Record your observations in Table 1.1. [2]

(iii) Repeat the procedure in **(ii)** using sweetcorn kernels. You will need to remove the outer skins of the sweetcorn. [2]

(iv) Explain why you need to crush the peas and sweetcorn before carrying out the food tests.

.... [1]

Table 1.1

	test-tube **A**	test-tube **B**	test-tube **C**
solution	Benedict's test	biuret test	iodine test
food group tested for			
colour obtained with peas			
colour obtained with sweetcorn			

(b) Use your observations in Table 1.1 to identify the food groups present in peas and sweetcorn.

peas ....

sweetcorn .... [3]

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

precaution ....

explanation .... [1]

(d) Plan an investigation to find out if peas and sweetcorn contain fat.

You should include the following in your plan:

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

....

....

....

....

....

....[4]

2 Solids **X**, **Y** and **Z** have the same cation, but different anions.

Solid **X** does **not** dissolve in water.

You are provided with:

distilled water
dilute hydrochloric acid
ammonia solution
barium chloride solution
silver nitrate solution
limewater

(a) Identifying the cation

You may use **only** liquids from the list of those provided.

You do not have to use all of the liquids.

(i) Make a solution by dissolving a **small** amount of solid **X** in dilute hydrochloric acid.

Record your observations.

observations ....

....

....[2]

(ii) Carry out **one** test, slowly and carefully, on the solution you have made to identify the cation present.

Describe the test and record all observations, including the colours of all solutions.

Identify the cation in solid **X**.

test ....

....

observations ....

....

....

....

cation in solid **X** is ....
[4]

(b) Identifying the anion in X

(i) Place solid **X** in the hard glass test-tube to a depth of 2 cm. Using a delivery tube, connect the hard glass test-tube to a test-tube one quarter full of limewater. Hold the test-tubes in the clamps provided.

Draw a labelled diagram of this apparatus connected together. There is no need to draw the stands, clamps or bosses.

[2]

(ii) Heat the hard glass test-tube in the apparatus connected as in **(b)(i)**. This will allow any gases produced to bubble through the limewater.

Stop heating when there is no further change in the limewater and **immediately** remove the delivery tube from the limewater.

Record your observations for both test-tubes and identify the anion in **X**.

observations ....

....

anion in **X** is ....
[2]

(c) **Identifying the anions in Y and Z**

Make a solution of solid **Y** in distilled water. Split the solution into two portions.

To one portion add barium chloride solution. To the other portion add silver nitrate solution.

Record in Table 2.1 your observations and identify the anion in **Y**.

Repeat the procedure above for solid **Z**.

Table 2.1

	solution of **Y**	solution of **Z**
barium chloride solution		
silver nitrate solution		
anion is …		

[3]

(d) Suggest a different reagent, **not** listed on page 4, which could also be used to identify the metal cation.

You will NOT carry out this test.

State the expected observation when your chosen reagent is added to a solution of **X**.

reagent ....

....

expected observation ....

.... [2]

3 You are going to investigate two different methods of insulating a beaker of water.

You will use the apparatus shown in Fig. 3.1.

Beaker **P** has a layer of insulation wrapped around it, but has no lid.

Beaker **Q** has a lid, but no insulation.

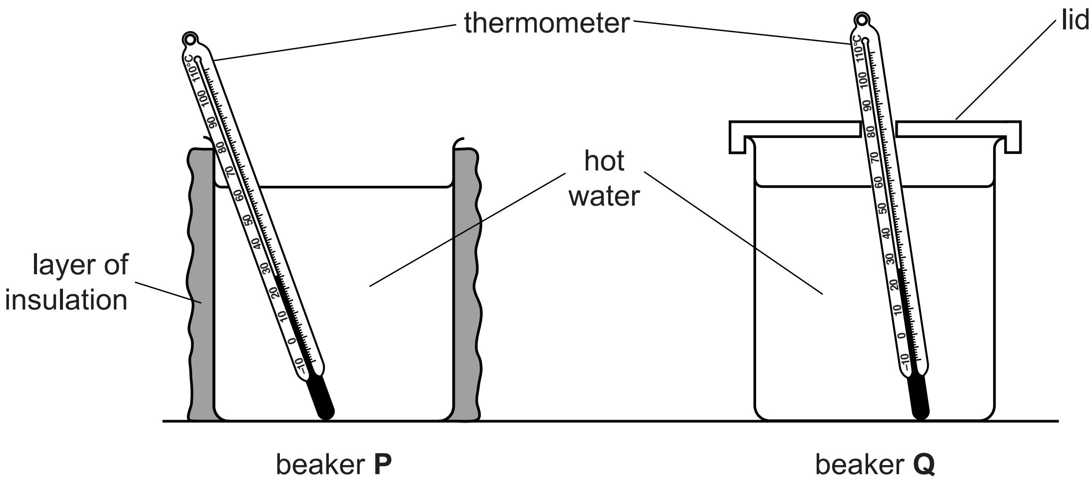

Fig. 3.1

(a) (i) Procedure

- Pour 200 cm^3 of hot water into beaker **P**.
- Place the thermometer into the water. When the reading stops rising, measure the temperature *T* of the hot water and start the stopwatch.

Record, in Table 3.1, this temperature at time *t* = 0. [1]

(ii) Measure the temperature of the hot water every 30 s for 180 s. Record your results in Table 3.1. [3]

Table 3.1

time *t* /	temperature *T* / ....
0	

beaker **P**

(iii) Complete Table 3.1 headings by adding the units. [1]

(b) **(i)** Calculate the fall in temperature T_P of the hot water in beaker **P** over the 180 s.

T_P = ... [1]

(ii) Calculate the average rate of fall in temperature R_P of the hot water in beaker **P** over the 180 s, using the equation shown.

$$R_P = \frac{T_P}{180}$$

R_P = ... [1]

(c) Pour 200 cm^3 of hot water into beaker **Q** and replace the lid. Repeat the procedure in **(a)(i)** to **(a)(ii)**. Record your results in Table 3.2.

Table 3.2

time *t* /	temperature *T* / ....
0	

beaker **Q**

[2]

(d) **(i)** Calculate the fall in temperature T_Q of the hot water in beaker **Q** over the 180 s.

T_Q = ... [1]

(ii) Calculate the average rate of fall in temperature, R_Q of the hot water in beaker **Q** over the 180 s.

R_Q = ... [1]

(e) State which is the more effective method of reducing thermal energy loss from a beaker of hot water.

Explain how you reach this conclusion.

method ....

....[1]

(f) Apart from adding a lid, state **two** other ways of reducing the loss of thermal energy from beaker **P** even further.

1 ....

2 ....

[2]

(g) State **one** condition which should be controlled to ensure that the comparison between beaker **P** and beaker **Q** is fair.

.... [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 then add aqueous barium chloride *or* 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