Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

4417827075

CO-ORDINATED SCIENCES **0654/53**

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

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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1 You are going to investigate a flower.

You are provided with a flower and a nectar sample in a test-tube. Nectar is a solution produced by flowers that are pollinated by insects.

(a) Procedure

- Add about 2 cm depth of Benedict's solution to the nectar sample in the test-tube.
- Place the test-tube in a hot water-bath for at least three minutes.

You may move on to **(b)** while you are waiting.

(i) State **and** explain the colour of the solution in the test-tube after heating in the water-bath.

colour ....

explanation ....
[2]

(ii) State **and** explain **one** safety precaution you took in carrying out this test.

safety precaution ....

explanation ....
[1]

(iii) A student carries out an investigation using Benedict's solution to compare the nutrient content of nectar from two different flowers.

State **one** variable which must be controlled.

....[1]

(iv) Explain how the results in **(a)(iii)** can be used to compare the nutrient content of the two nectars.

....

....[1]

(b) Remove the petals from one side of the flower so that the inner structures are visible.

(i) In the box provided, make a large detailed pencil drawing of the flower.

This should show all the flower parts.

[4]

(ii) On your drawing, label a petal, the stigma and an anther. [3]

(c) **(i)** A student crushes some olives, producing olive juice.

Describe the test used to confirm a sample of the olive juice contains fat.

Include the observation for a positive result.

test ....

....

....

observation ....

.... [2]

(ii) Suggest why this method would be unsuitable to test for the presence of fat in milk.

....[1]

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

Solid **J** is a mixture of two compounds. You are going to separate the compounds and identify some of the ions in each compound.

(a) Procedure

- Place all of solid **J** in a beaker.
- Add 20 cm^3 of distilled water.
- Use the stirring rod to stir the mixture well for 30 seconds.
- Filter the mixture into a large test-tube.
- **Keep the filtrate and the residue** for testing in **(b)** and **(c)**.

(i) Draw **and** label the apparatus you used to filter the mixture.

Label the positions of the filtrate and the residue.

[3]

(ii) Describe the colours of the filtrate and residue.

colour of filtrate ....

colour of residue ....
[1]

(b) (i) Procedure

- In a clean test-tube, place 2 cm depth of the liquid collected in the large test-tube in **(a)**.
- **Keep the remaining liquid in the large test-tube for use in (b)(ii).**
- Add sodium hydroxide solution until the test-tube is nearly half-full.
- Record your observations.
- **Gently heat** the test-tube, taking care to point the test-tube away from people.
- Test for any gases near the mouth of the test-tube using damp blue and damp red litmus papers.
- Record your observations.

observations for:

addition of sodium hydroxide solution before heating ....

....

damp blue litmus ....

damp red litmus ....
[2]

(ii) Procedure

- In a clean test-tube, place 2 cm depth of the liquid collected in the large test-tube in **(a)**.
- Add an equal volume of nitric acid.
- Record your observations.
- Add a few drops of barium nitrate solution.
- Record your observations.

observations for:

addition of nitric acid ....

....

addition of barium nitrate ....

....
[1]

(iii) Use your observations in **(b)(i)** and **(b)(ii)** to state what conclusions you can make about the ions present or not present in the liquid from **(a)**.

conclusions about ions after testing with:

sodium hydroxide solution ....

litmus papers ....

nitric acid ....

barium nitrate ....

[4]

(c) Scrape the solid on the filter paper from **(a)** into a large test-tube.

(i) Add 10 cm^3 of sulfuric acid to the test-tube.

Record your observation.

observation ....

....

[1]

(ii) **Procedure**

- Carefully heat the mixture from **(c)(i)** for about one minute.
- Leave the test-tube to cool for about one minute.
- If solid still remains, either filter the mixture or decant to obtain the liquid **L** in a test-tube.
- Using a small amount of this liquid **L**, test for the cation present with sodium hydroxide solution.
- Record your observations **and** identify the cation.

observations ....

....

cation is ....

....

[2]

(iii) The compound in the solid on the filter paper from **(a)** has reacted with the sulfuric acid.

Use your observations and conclusion in **(c)(i)** and **(c)(ii)** and your knowledge of the reactions of acids to suggest an identity for the compound in this solid.

compound in this solid is ....

[1]

3 You are going to investigate how the temperature of the surroundings affects the rate of cooling of water in a test-tube.

(a) Procedure

- The test-tube has been set up in a stand, as shown in Fig. 3.1.

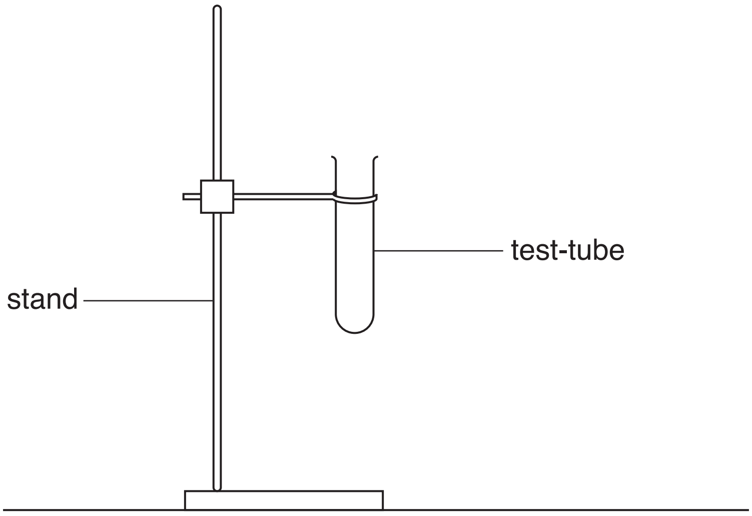

Fig. 3.1

- Pour 200 cm^3 of the cold water provided into a beaker.
- Pour hot water into the test-tube until it is half-full.
- Place the test-tube into the beaker of cold water as shown in Fig. 3.2.

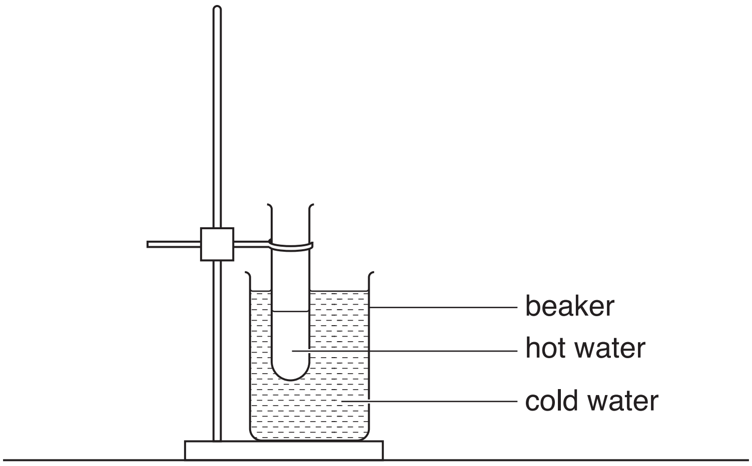

Fig. 3.2

- Place the thermometer into the test-tube.
- Wait for one minute.

(i) Measure the temperature θ of the hot water in the test-tube and record this in Table 3.1 at time $t = 0$. Start the stopclock. [1]

(ii) Record, in Table 3.1, the temperature θ of the water and the time t every 30 seconds for a total time of 3 minutes. [2]

Table 3.1

	test-tube cooling in beaker of cold water	test-tube cooling in beaker of warm water
time t/	temperature of water in test-tube θ/	temperature of water in test-tube θ/ ....
0		

(b) **(i)** State why it is important to wait one minute before recording the initial temperature of the hot water.

....

....[1]

(ii) State **two** precautions that you took to ensure that the temperatures that you measured were as accurate as possible.

1 ....

....

2 ....

....

[2]

(c) **Procedure**

- Empty the water from the test-tube.
- Place the test-tube back in the stand, as shown in Fig. 3.1.
- Empty the cold water from the beaker.
- Pour 200 cm^3 of the warm water provided into the beaker.
- Pour hot water into the test-tube until it is half-full.
- Place the test-tube into the beaker of warm water, using the stand as in **(a)**.
- Place the thermometer into the test-tube.
- Wait for one minute.

Repeat the steps described in **(a)(i)** and **(a)(ii)**. [3]

(d) **(i)** Complete Table 3.1 by adding correct units for each quantity at the top of each column. [1]

(ii) Calculate the decrease in the temperatures of the water in the test-tube after 3 minutes when cooling in the beaker of cold water and when cooling in the beaker of warm water.

temperature decrease in beaker of cold water = ...

temperature decrease in beaker of warm water = ...
[1]

(e) Use the information in **(d)(ii)** or your results in Table 3.1 to write a conclusion describing how the temperature of the surroundings affects cooling of the water in the test-tube.

....

....

....

....[2]

(f) Suggest **one** improvement that you could make to the experimental procedure which would allow a fairer comparison between cooling in cold water and cooling in warm water.

Explain how your improvement makes the comparison fairer.

improvement ....

....

explanation ....

....

.... [2]

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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 result*
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