MINISTRY OF EDUCATION, SINGAPORE
in collaboration with
CAMBRIDGE ASSESSMENT INTERNATIONAL EDUCATION
General Certificate of Education Ordinary Level

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SCIENCE (CHEMISTRY, BIOLOGY) 5088/05

Paper 5 Practical Test

For examination from 2024

SPECIMEN PAPER

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Please check that your name, Centre/index number and school name are printed **CORRECTLY** on the barcode label.
Give details of the practical shift and laboratory, where appropriate, in the boxes provided.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, glue, correction fluid or highlighters.
The use of an approved calculator is expected, where appropriate.
DO **NOT** WRITE ON ANY BARCODES.

Shift
Laboratory

Answer **both** questions.
You are advised to spend 45 minutes on each question.
Chemistry practical notes for this paper are printed on page 10.

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	
Total	

This document consists of **9** printed pages and **1** blank page.

Singapore Examinations and Assessment Board

Cambridge Assessment International Education

[Turn over

1 You will carry out experiments to investigate what happens when solid **W** dissolves in water and to determine the ions present in **W**. You are provided with a sample of **W**.

(a) (i) Read all the instructions before starting the experiment in **1(a)(i)**. Record all your results in Table 1.1.

Step 1. Weigh the container containing **W** with its cap and record the balance reading.

Step 2. Place a polystyrene cup inside the 250 cm^3 beaker.

Step 3. Use a measuring cylinder to measure 25.0 cm^3 of deionised water. Carefully add the water to the polystyrene cup.

Step 4. Place a thermometer into the water and record the initial temperature of the water.

Step 5. Add the entire sample of **W** to the cup and carefully stir the mixture with the thermometer.

Step 6. Record the final temperature of the solution formed when **all** of **W** has dissolved.

Step 7. Weigh the emptied container with its cap and record its mass.

Table 1.1

mass of container containing **W** with cap / g	
initial temperature of deionised water / °C	
final temperature of solution formed when **W** dissolved completely in water / °C	
mass of emptied container with cap / g	

[3]

(ii) Use your results from Table 1.1 to calculate the mass of **W** added to the cup and the change in temperature.

mass of **W** = ... g

change in temperature = ... °C

[1]

(iii) Explain, using your results, whether dissolving **W** in water is an exothermic change or an endothermic change.

.....

..... [1]

(b) A student carried out a similar experiment to the one described in **(a)** but used a different solid compound. She dissolved different masses of the solid in 25.0 cm^3 of deionised water.

The results are given in Table 1.2.

Table 1.2

mass of solid used / g	1.5	3.0
change in temperature / °C	5.5	11.0

(i) The student concluded that the change in temperature is directly proportional to mass of solid dissolved.

Deduce the change in temperature when 4.5 g of solid is used if the change in temperature is directly proportional to mass of solid dissolved.

change in temperature = ... °C [1]

(ii) The student did not have enough data to be certain of her conclusion.

Outline what further measurements she should take to confirm her conclusion.

Briefly describe how she should process her results to determine the relationship between change in temperature and mass of solid.

.....

.....

..... [2]

(c) **Z** is a solution of solid **W**. **Z** contains one cation and two anions.

(i) You are provided with a sample of **Z**.

Carry out the tests in Table 1.3.

You should test any gases evolved. The volumes given below are approximate and should be estimated rather than measured.

Record your observations in Table 1.3. If there are no observable changes, write '**no observable change**'.

Table 1.3

test	observations
Add 1 cm depth of solution **Z** to a clean boiling tube. Add 1 cm depth of sodium hydroxide slowly with shaking to **Z** in the tube. Heat the mixture gently.	
Add 1 cm depth of solution **Z** to a clean test-tube. Add 1 cm depth of dilute nitric acid to **Z** in the tube. Then add 1 cm depth of aqueous silver nitrate to the mixture in the tube.	

[4]

(ii) Using your observations in Table 1.3, identify the ions present in **Z**. If you are unable to identify any of the ions, write 'unknown.'

The cation is .....

The anions are ..... and .....

[3]

[Total: 15]

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2 You are provided with a variegated (green and white) leaf which is partly covered with a mask of black paper. The mask prevents light from reaching the leaf.

(a) Step 1. Half-fill the 250 cm^3 beaker with water.

Step 2. Place the beaker on a tripod and heat it until the water boils.

While the water in the beaker is being heated, continue with **2(a)(i)**.

(i) In the space below, draw a diagram of the leaf to show the mask and the green and white areas of the leaf. Label your diagram.

[2]

Step 3. When the water in the beaker is boiling, remove the mask from the leaf and use the forceps to submerge the leaf into the boiling water. Keep the leaf in the boiling water for at least 3 minutes.

Step 4. **Turn off the gas to the Bunsen burner.**

Step 5. Use the forceps to remove the leaf from the boiling water and put the leaf into the empty boiling tube.

Step 6. Use the dropper of the container labelled **alcohol** to add alcohol to the boiling tube so that it just covers the leaf. **Keep the alcohol away from any open flames.**

Step 7. Place the boiling tube in the beaker of hot water and leave it for 5 minutes.

Step 8. Use the test-tube holder to remove the boiling tube from the hot water and place it in the test-tube rack.

Step 9. Use the forceps to take the leaf out of the boiling tube carefully and gently dip it in the hot water in the beaker for about 30 seconds.

Step 10. Spread the leaf out on the petri dish and add enough iodine solution to cover the leaf. Leave the leaf for 2 minutes.

Step 11. Pour the excess iodine solution from the petri dish into the beaker labelled **for waste**.

(ii) After completing step 11, draw a diagram of the leaf again in the space below. Label your diagram to indicate the areas with **and** without starch.

[2]

(iii) Use the results of the investigation to suggest **two** conditions needed for starch formation in a leaf.

1 .....

2 .....
[2]

(iv) The alcohol removed the chlorophyll from the green parts of the leaf.

Suggest why this was necessary.

.....

..... [1]

(b) A student was provided with a variegated plant.

Using a variegated plant and a chemical that absorbs carbon dioxide, briefly describe an experimental setup that could be used to investigate if carbon dioxide is needed for photosynthesis. State one variable to be kept constant in this investigation. You can include any equipment or materials normally available in a school laboratory.

.....

.....

.....

..... [3]

(c) You will investigate the amount of carbon dioxide in the atmosphere and in air you breathe out (exhale). You are provided with the apparatus shown in Fig. 2.1. When carrying out the tests in part **(i)** you must **take care not to ingest any limewater**.

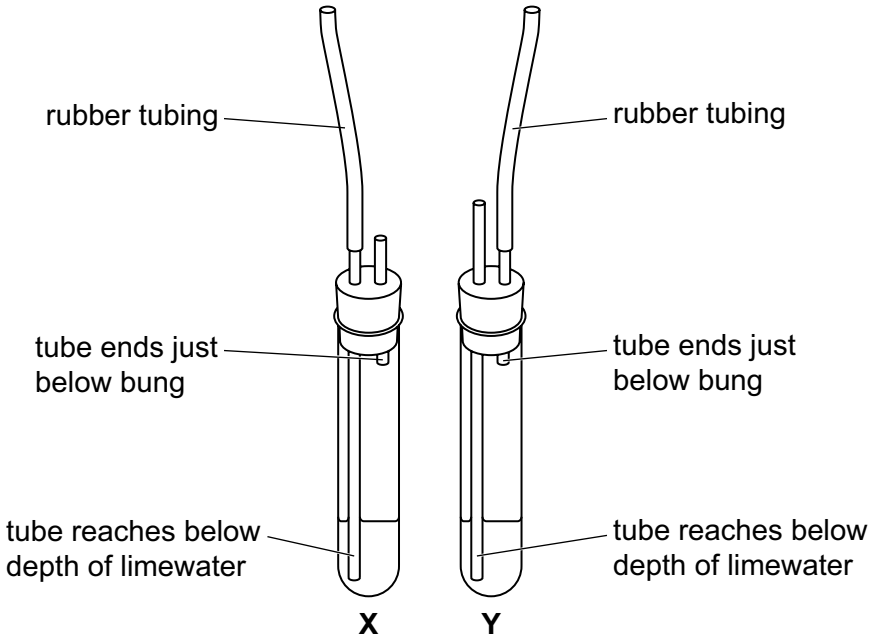

Fig. 2.1

(i) Step 1 Place the end of the rubber tubing of boiling tube **X** in your mouth.

Step 2 Breathe out very gently through the rubber tubing using your mouth. Repeat until you observe a change in the limewater. Record in Table 2.1 the number of times you breathed out for the limewater to change.

Step 3 Breathe in very gently using your mouth through the rubber tubing of boiling tube **Y**. Repeat until you observe a change in the limewater. Record in Table 2.1 the number of times you breathed in for the limewater to change.

Table 2.1

boiling tube	number of times you breathed in / out
X	
Y	

[1]

(ii) Describe the change you observed in the limewater.

.....

..... [1]

(iii) Using your results, compare the carbon dioxide concentration in the atmosphere and in exhaled air.

.....

..... [2]

(iv) Identify **one** possible source of error in the procedure you used in **2(c)(i)**.

..... [1]

[Total: 15]

CHEMISTRY PRACTICAL NOTES

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*
aluminium (Al^{3+})	white ppt., soluble in excess giving a colourless solution	white ppt., insoluble in excess
ammonium (NH_4^+)	ammonia produced on warming	–
calcium (Ca^{2+})	white ppt., insoluble in excess	no ppt.
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)	gives white ppt. with limewater (ppt. dissolves with excess CO_2)
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	‘pops’ with a lighted splint
oxygen (O_2)	relights a glowing splint
sulfur dioxide (SO_2)	turns aqueous acidified potassium manganate(VII) from purple to colourless