



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

CANDIDATE
NUMBER

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

* 3 0 0 7 0 1 4 3 0 3 *

COMBINED SCIENCE

0653/52

Paper 5 Practical Test

October/November 2013

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 a 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.

Chemistry practical notes 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 **12** printed pages.



- 1 You are provided with two Petri dishes, **A** and **B**, each set up as shown in Fig. 1.1. Both dishes contain a starch-agar mixture. This is a gel to which starch solution has been added.

This experiment uses barley grains that have been germinated. Some of the barley grains have been killed by being placed in boiling water.

Barley grains have been placed on the starch-agar mixture in each of the two dishes, and left for a few days.

- In dish **A**, the barley grains are living.
- In dish **B**, the barley grains are dead.

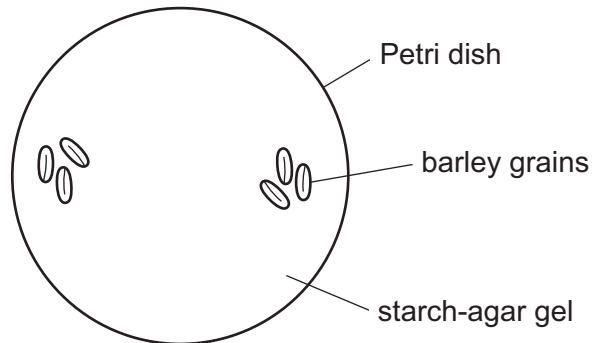


Fig. 1.1

- (a) You are going to look for evidence of starch-digesting enzymes being produced by the barley grains.
- (i) Remove the lids from Petri dishes **A** and **B**, and make drawings in Table 1.1 to show the positions of the barley grains in each dish.

Table 1.1

| dish A | dish B |
|---------------|---------------|
| | |

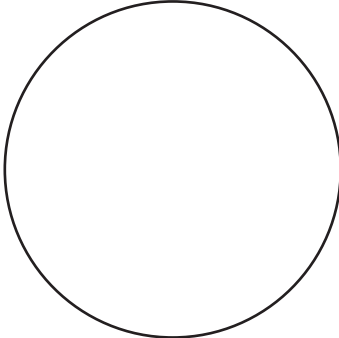
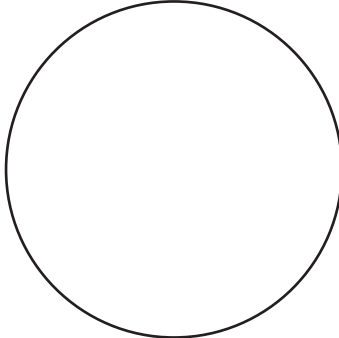
[1]

- (ii) Remove the barley grains from each of the dishes **A** and **B**.

Test the gel in the Petri dishes for starch, by covering the gel with iodine solution, and then waiting for a minute to let any colour changes happen.

Pour away the excess iodine solution, and then place the dishes onto two white tiles. Make drawings in Table 1.2 to show the distribution of the colours in each dish. Label the colours.

Table 1.2

| dish A | dish B |
|---|--|
|  |  |

[2]

- (iii) Compare the two drawings that you made of dish **A**.

.....
..... [1]

- (iv) Write a conclusion based on this comparison.

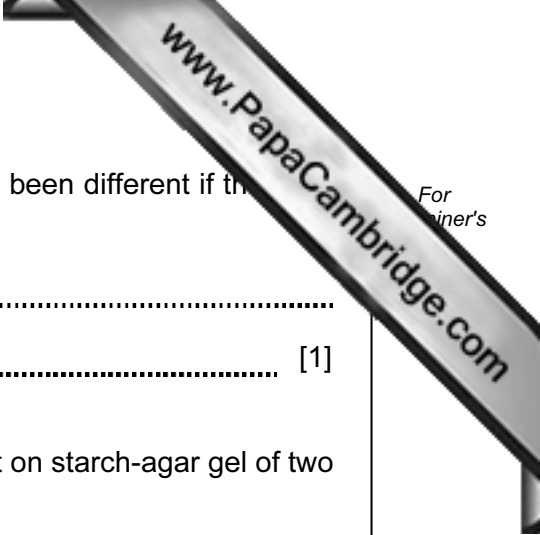
.....
..... [1]

- (v) In dish **B**, dead barley grains were used. What is the purpose of dish **B**?

.....
..... [1]

- (b) Explain why several barley grains were used in each Petri dish, rather than just one.

.....
.....
..... [1]



(c) Suggest how the results of the iodine experiment would have been different if the dishes had been kept at a lower temperature.

.....
..... [1]

(d) Outline an experiment that you could do to compare the effect on starch-agar gel of two different varieties of seeds.

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



Please turn over for Question 2.

2 You are going to find the mass of a metre rule by a balancing method.

- (a) (i) Place the knife edge directly under the 55.0 cm mark of the metre rule so that the distance $d = 55.0$ cm. Place the load **M** on the metre rule and adjust its position carefully until the rule is just balanced, as shown in Fig. 2.1.

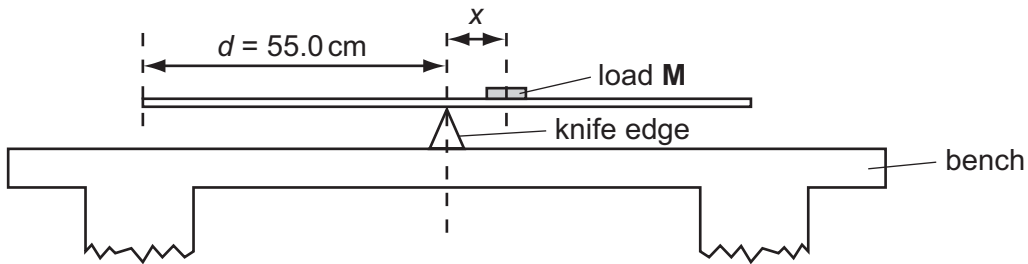


Fig. 2.1

Measure the distance x from the centre of the load to the knife edge.

Record this distance in Table 2.1.

[1]

Table 2.1

| distance d /cm | x /cm |
|------------------|---------|
| 55.0 | |
| 60.0 | |
| 65.0 | |
| 70.0 | |
| 75.0 | |

- (ii) Describe how you located the position of the centre of the load **M** before you measured the distance x .

.....

 [1]

- (iii) Repeat the procedure to balance the load when the knife edge is placed at distances d of 60.0 cm, 65.0 cm, 70.0 cm and 75.0 cm from the end of the metre rule.

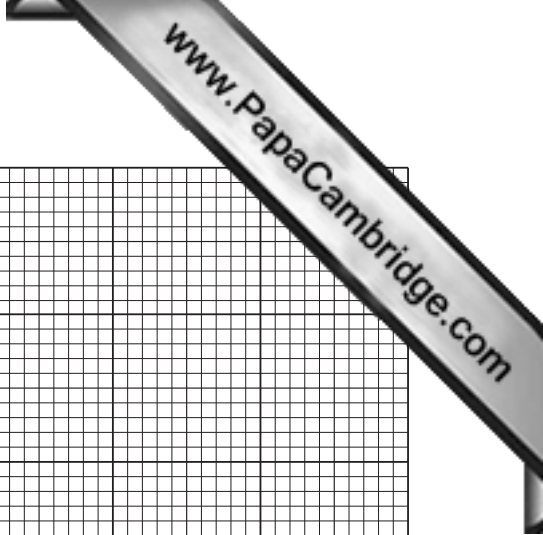
Record the corresponding distances x in Table 2.1.

[2]

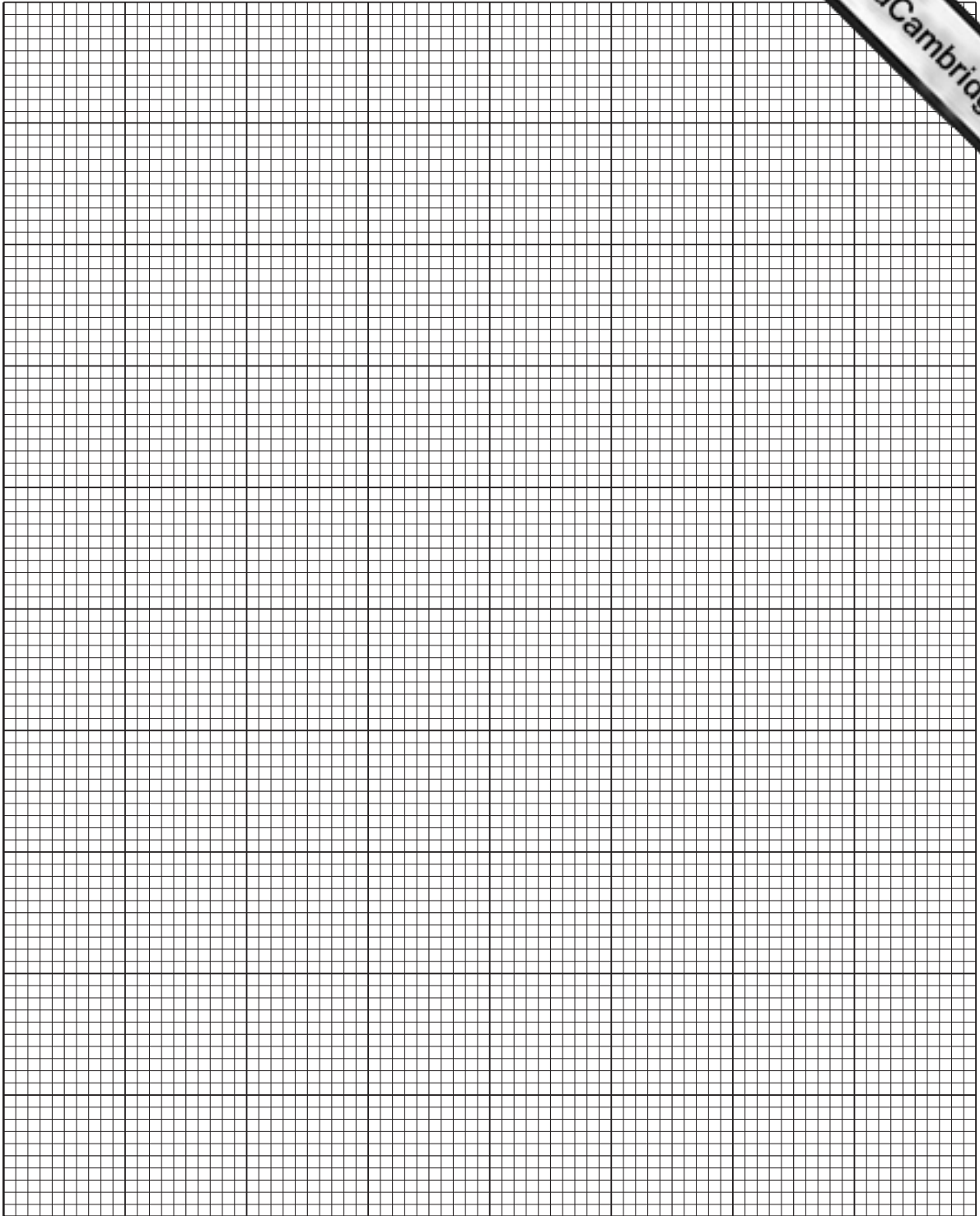
- (b) (i) On the grid provided on page 7, plot a graph of d against x . You do not need to start both axes from the origin.

Draw the best fit straight line.

[3]



d/cm



x/cm

- (ii) 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]

- (c) The gradient of your line is related to the mass m in grams of the metre rule equation

$$m = \frac{150}{\text{gradient}}$$

Determine the mass of the metre rule.

$$m = \dots\dots\dots \text{ g [1]}$$

Please turn over for Question 3.

- 3 Solution **X** is a mixture containing two cations and two anions. You are going to carry out the tests below to help you identify these ions. You may wish to use the Chemistry Practical Notes on page 12 to help you interpret the results of your tests.

(a) (i) Place about 2 cm³ of solution **X** in a test-tube and add an equal volume of dilute nitric acid. Retain this mixture for (a)(ii) and (a)(iii).

Record in Table 3.1 your observations.

(ii) To half of the mixture from (a)(i) add an equal volume of barium chloride solution.

Record in Table 3.1 your observations and conclusions about any ions present.

(iii) To the other half of the mixture from (a)(i) add an equal volume of silver nitrate solution.

Record in Table 3.1 your observations and conclusions about any ions present.

Table 3.1

| test | observations | conclusions |
|-------------------------------|--------------|-------------|
| (i) dilute nitric acid | [1] | |
| (ii) barium chloride solution | [1] | [1] |
| (iii) silver nitrate solution | [1] | [1] |

- (b) Place about 1 cm³ of solution **X** in a test-tube and add ammonia solution until the test-tube is three-quarters full.

Filter the mixture.

Record in Table 3.2 your observations and conclusions about any ions present.

Table 3.2

| test | observations | conclusions |
|------------------|--------------|-------------|
| ammonia solution | | |
| | [2] | [2] |

- (c) Use the observations and conclusions that you have recorded in Tables 3.1 and 3.2 to suggest names for the compounds that might be contained in mixture **X**.

compounds in **X**

.....

..... [1]

CHEMISTRY PRACTICAL NOTES

Test for anions

| <i>anion</i> | <i>test</i> | <i>test result</i> |
|---|---|--|
| 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 <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 (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

| <i>gas</i> | <i>test and test results</i> |
|----------------------------------|----------------------------------|
| 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 |

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.