Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/53**

Paper 5 Practical Test **October/November 2016**

1 hour 15 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.

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	

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **9** printed pages and **3** blank pages.

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Read through all the questions on the paper carefully before starting work.

1 Catalase is an enzyme found in plant and animal cells. It catalyses the breakdown of hydrogen peroxide to form water and oxygen.

$$\underset{2H_2O_2}{\text{hydrogen peroxide}} \xrightarrow{\text{catalase}} \underset{2H_2O \ + \ O_2}{\text{water + oxygen}}$$

You are going to investigate the effect of surface area on the breakdown of hydrogen peroxide by catalase.

You will use potato as a source of catalase. You will vary the surface area of the potato and measure the volume of oxygen produced by the break down of the hydrogen peroxide.

Read all instructions but DO NOT CARRY THEM OUT until you have drawn a table for your results in the space provided in 1(a).

You should use the gloves and eye protection provided while you are carrying out the practical work.

Step 1 Lay the six potato sticks next to each other on the white tile.

Cut each potato stick to exactly 4 cm in length.

Step 2 Take two of the potato sticks and cut each one into eight equal pieces as shown in Fig. 1.1.

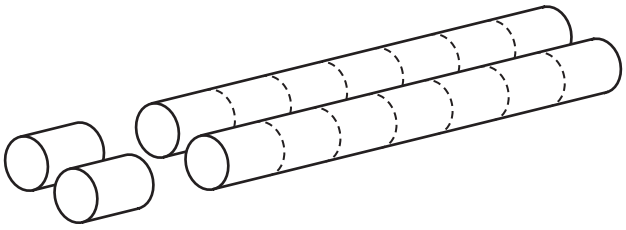

Fig. 1.1

Step 3 Repeat step 2 with two more potato sticks. Leave the last two potato sticks whole.

Step 4 Submerge the 25 cm^3 measuring cylinder in the tub of water and allow it to fill with water. Turn the measuring cylinder upside down keeping the open end under the water in the tub as shown in Fig. 1.2.

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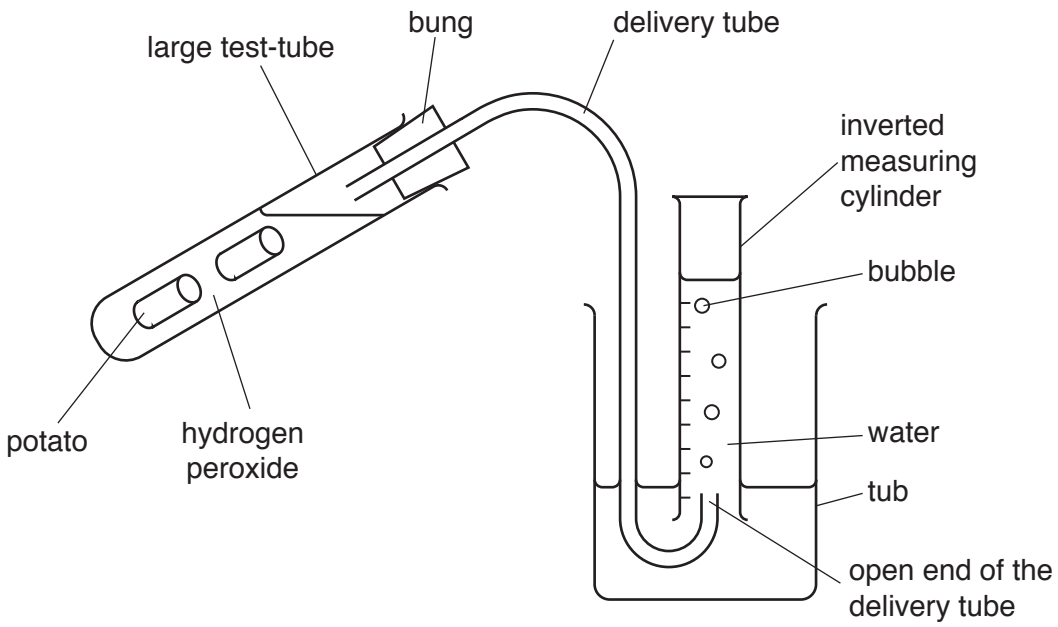

Fig. 1.2

You are going to carry out a practice experiment using two of the potato sticks that have been cut into 8 (a total of 16 pieces). Record the results of this experiment in the space provided in **1(c)**.

Step 5 Place the open end of the delivery tube into the inverted measuring cylinder in the tub of water.

Step 6 Use the syringe to add 20 cm^3 of hydrogen peroxide to the large test-tube.

Step 7 Add the 16 pieces of potato that you cut in Step 2 to the large test-tube and immediately place the bung, attached to the other end of the delivery tube, into the large test-tube.

Step 8 Start the timer and carefully shake the large test-tube briefly every 30 seconds for three minutes.

Step 9 Record the volume of oxygen gas collected in the measuring cylinder for your practice experiment in **1(c)**.

Step 10 Remove the bung and pour the used hydrogen peroxide solution and potato into the beaker labelled **waste**.

Step 11 Rinse the large test-tube with the washing water provided.

Use the results of your practice experiment to choose the most appropriate size of measuring cylinder to use to measure the volume of oxygen gas produced in three minutes. Record your choice in **1(c)**.

Step 12 Repeat Steps 4 to 8 using the 16 pieces of potato that you cut in Step 3 and your chosen measuring cylinder. Record in your table in **1(a)**, the volume of oxygen gas collected in the measuring cylinder after three minutes.

Step 13 Repeat Steps 4 to 8 using the remaining two whole potato sticks in Step 7 and your chosen measuring cylinder. Record the volume of oxygen gas collected in the measuring cylinder after three minutes in your table in **1(a)**.

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(a) Prepare a table to record your results.

View solution

[4]

(b) **(i)** Calculate the rate of oxygen gas production for each of the values in your table. Give your answer in cm^3 per minute to one decimal place.

Show your working.

View solution

whole potato stick ..... cm^3 per minute

cut potato stick ..... cm^3 per minute
[2]

(ii) Describe the effect on the surface area of the potato of cutting the potato stick into eight pieces.

.....

.....[1]

(iii) Describe **and** explain, using your results, the effect of surface area on the volume of oxygen gas produced.

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.....[3]

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(c) Complete the following:

Practice volume of oxygen produced .....

Size of the measuring cylinder used for Steps 12 and 13 .....

Explain why you chose that size.

View solution

Explanation .....

.....

.....[1]

(d) State **two** variables that were kept constant in this investigation.

View solution

1 .....

2 .....

[2]

(e) Identify **two** sources of error in this method and suggest an improvement for each error.

View solution

error .....

.....

improvement .....

.....

.....

error .....

.....

improvement .....

.....

.....

[4]

(f) Hydrogen peroxide breaks down slowly without catalase enzyme being present.

Describe a suitable control for this investigation.

View solution

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.....[2]

(g) Another student wanted to investigate the amount of catalase present in different food plants.

Describe a method that the student could use to carry out this investigation.

View solution

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.....[5]

(h) Table 1.1 shows the volume of oxygen produced when the student carried out the experiment for three different food plants.

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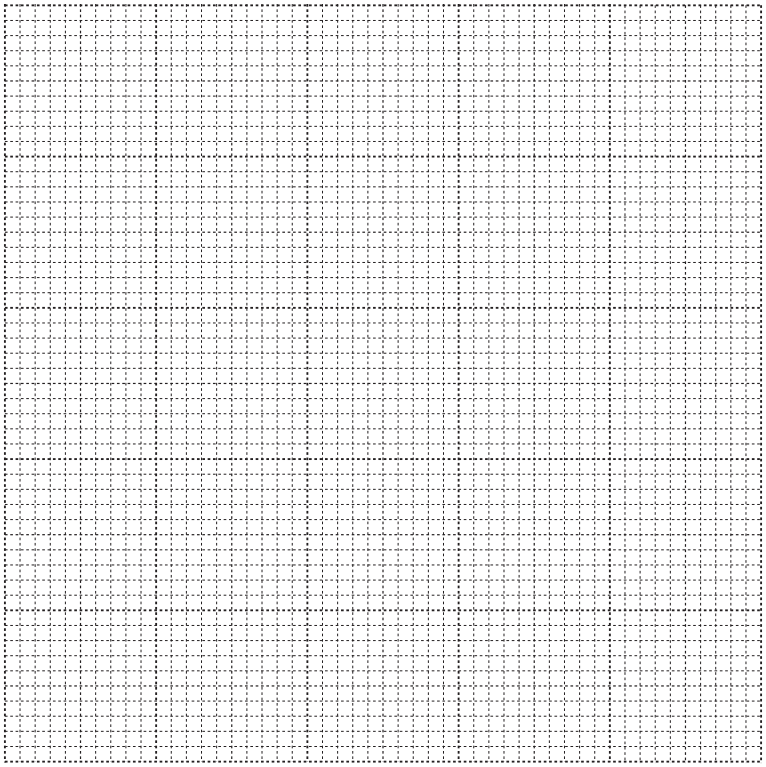
Table 1.1

food plant	volume of oxygen produced / cm^3
A	9.2
B	0.8
C	6.7

Plot a graph of the data from Table 1.1 on the grid.



[4]

(i) Describe how the student could test food prepared from these plants for the presence of reducing sugars.

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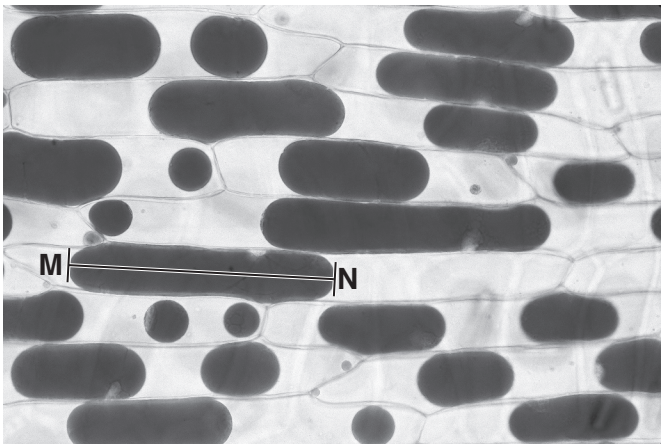
.....[3]

[Total: 31]

View solution

2 Fig. 2.1 shows red onion cells, viewed through a microscope, that have been immersed in a strong salt solution.

In a red onion cell the dark red pigment is located in the vacuole of the cell.



magnification ×50

Fig. 2.1

(a) (i) Make a large drawing of **three** of the cells shown in Fig. 2.1.

On **one** of the cells label the vacuole.

View solution

[5]

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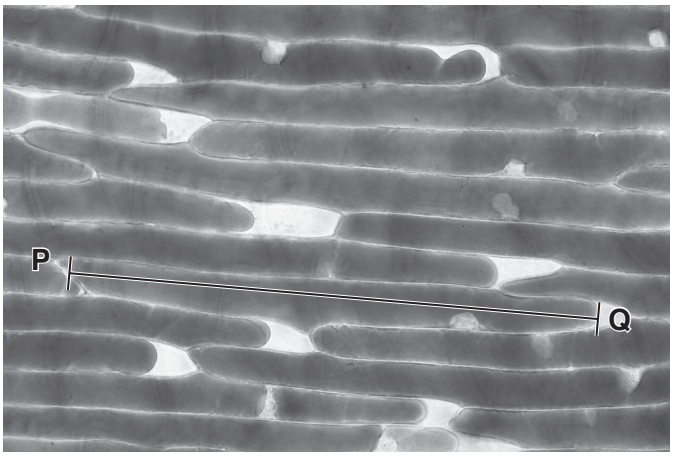
Fig. 2.2 shows red onion cells, viewed through a microscope, that have been immersed in a weak salt solution.



magnification ×50

Fig. 2.2

(ii) Measure the observed maximum length of the vacuole shown by the line **MN** on Fig. 2.1.

..... mm

Measure the observed maximum length of the vacuole shown by the line **PQ** on Fig. 2.2.

..... mm

Calculate the percentage increase in the length of the vacuole.

View solution

Show your working and give your answer to the nearest whole number.

.....

[3]

(b) State **one** visible similarity between the cells in Fig. 2.1 and the cells in Fig. 2.2.

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.....

.....[1]

[Total: 9]

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