Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **October/November 2021**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Any blank pages are indicated.

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1 **(a)** Dialysis tubing can act as a partially permeable membrane because it has microscopic holes that allow small soluble molecules to pass through by diffusion.

A student investigated the molecules that can diffuse through dialysis tubing.

Step 1 A piece of dialysis tubing was soaked in water and a knot was tied at one end to form a bag.

Step 2 The unknotted end of the dialysis tubing was opened and 20 cm^3 of a solution, **M**, was put into the dialysis tubing bag.

Step 3 The outside of the dialysis tubing bag was rinsed with distilled water.

Step 4 The dialysis tubing bag was put inside a large test-tube and the open end of the tubing was folded over the top of the large test-tube. It was secured with an elastic band, as shown in Fig. 1.1.

Step 5 The large test-tube was then filled with distilled water, as shown in Fig. 1.1.

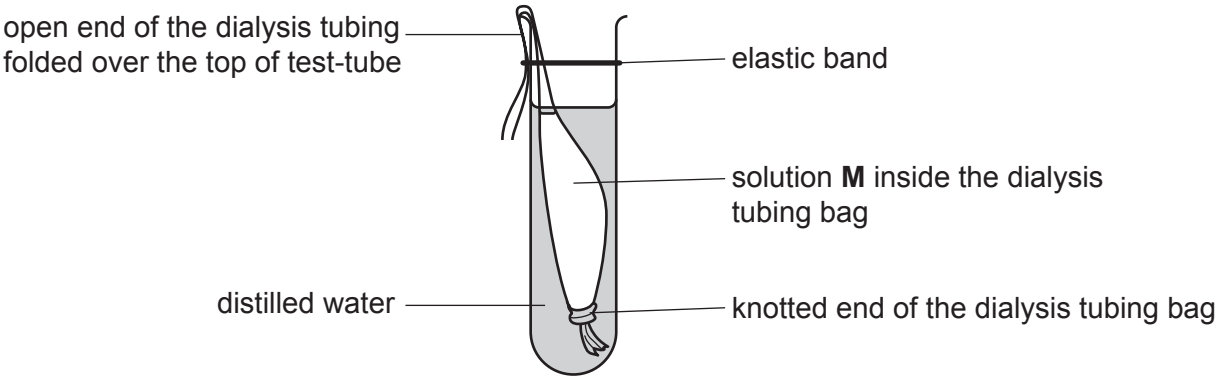

Fig. 1.1

Step 6 The large test-tube was left in a test-tube rack for 15 minutes.

Step 7 After 15 minutes, the dialysis tubing bag was removed from the large test-tube and the contents of the bag were emptied into a beaker labelled **M**. 2 cm^3 samples of solution **M** were tested for reducing sugars, protein and starch.

Step 8 The liquid remaining in the large test-tube was emptied into a beaker labelled **T**. 2 cm^3 samples of this liquid were also tested for reducing sugars, protein and starch.

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The student's results are shown in Fig. 1.2.

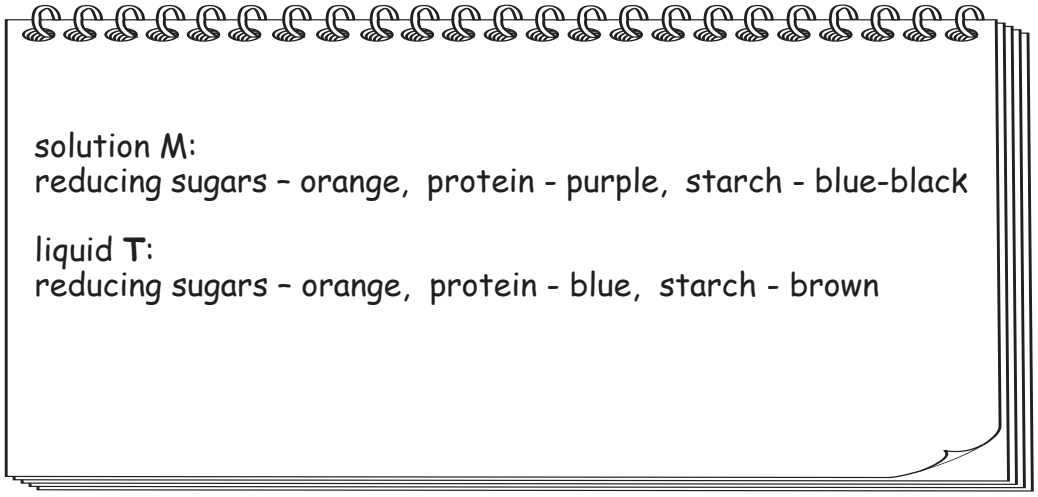

Fig. 1.2

(i) Prepare a table to record the results shown in Fig. 1.2.

View solution

[3]

(ii) State the names of the food-testing reagents that would be used to test for the presence of each substance.

reducing sugars .....

protein .....

starch .....

[3]

View solution

(iii) State which substances are present in solution **M**.

View solution

.....

.....

..... [1]

(iv) Conclude, based on the results, if any of the substances in solution **M** diffused through the dialysis tubing membrane.

State the evidence from the results for this conclusion.

View solution

substance(s) .....

evidence .....

.....

[1]

(b) Explain why it was important to rinse the outside of the dialysis tubing bag in step 3.

View solution

.....

.....

..... [1]

(c) Identify **one** hazard in the investigation described in **1(a)** and state **one** precaution to reduce the risk of this hazard.

hazard .....

precaution .....

.....

[2]

View solution

(d) Starch can be broken down into reducing sugars. The enzyme amylase catalyses this reaction.


View solution

Plan an investigation to find out the effect of pH on the activity of the enzyme amylase.

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.....

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.....

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..... [6]

[Total: 17]

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2 **(a)** A student used an aquatic plant to investigate the effect of temperature on the rate of photosynthesis.

View solution

Fig. 2.1 shows the apparatus used by the student.

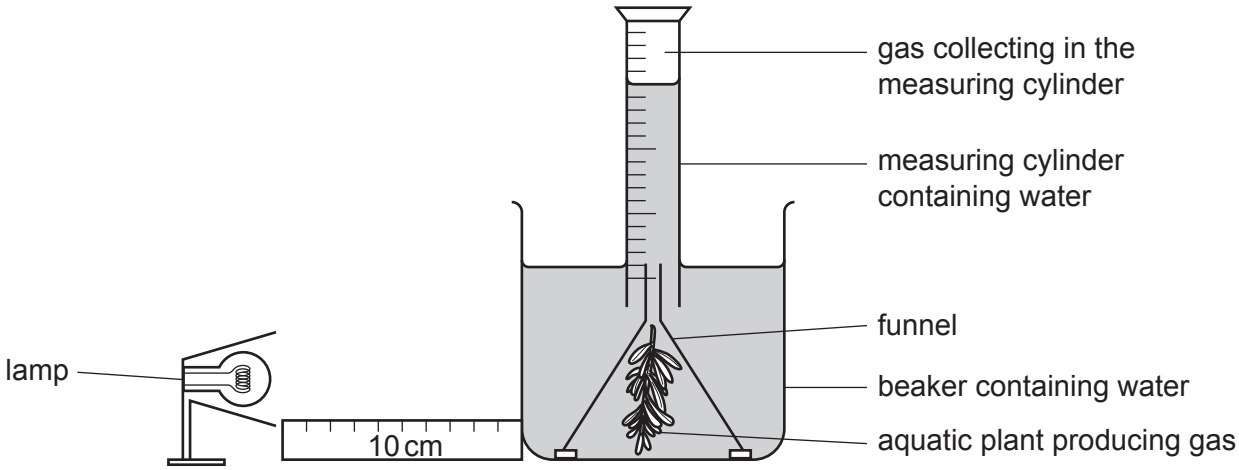


Fig. 2.1

A lamp was placed at a distance of 10 cm from the apparatus. Sodium hydrogencarbonate was added to the water to provide a source of carbon dioxide.

The student measured the volume of gas produced in 20 minutes at six different temperatures.

(i) State the variable that was changed (independent variable) in this investigation.

..... [1]

(ii) State **two** variables that should be kept constant in this investigation.

View solution

1 .....

2 .....

[2]

(iii) Only one set of results was collected in the investigation described in **2(a)**.

Explain why repeating the investigation two more times would be an improvement to the method.

.....

.....

..... [1]

View solution

(b) The results of the investigation are shown in Table 2.1.

View solution

Table 2.1

temperature / °C	volume of gas collected in 20 minutes / cm^3	rate of photosynthesis / cm^3 per minute
5	5.0	0.25
10	7.8	0.39
15	12.0	0.60
20	22.8	1.14
25	21.0	1.05
30	16.0	0.80

(i) Calculate the percentage increase in the volume of gas produced from 10 °C to 15 °C.

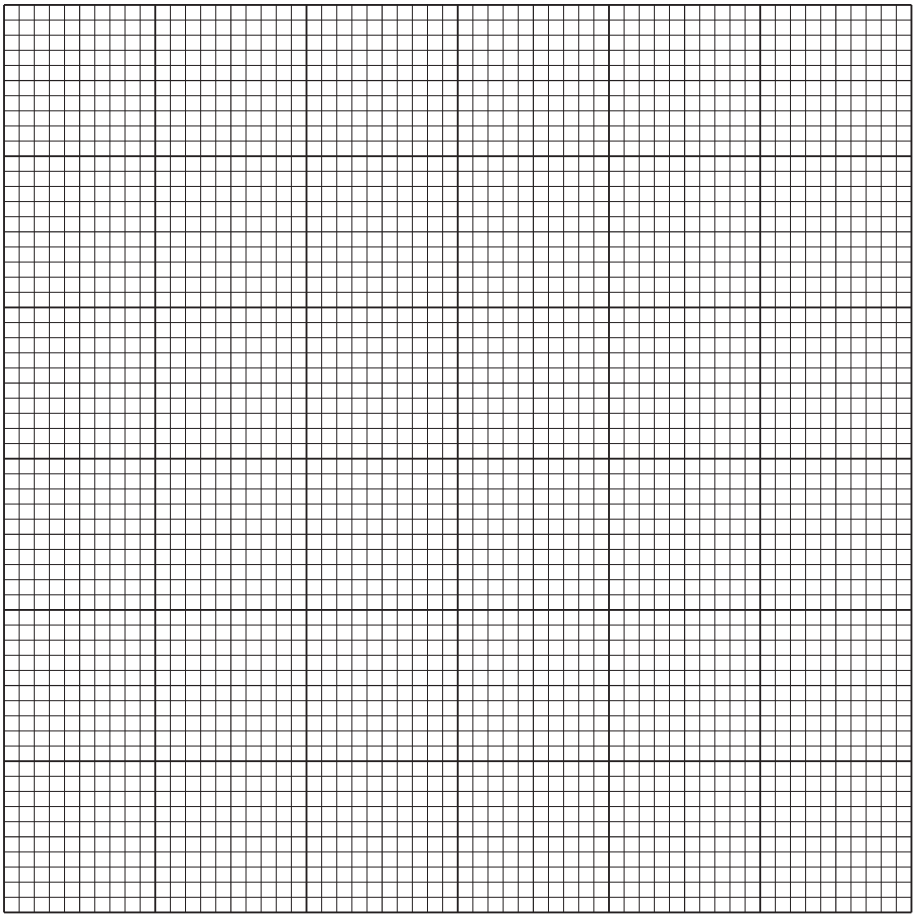
Give your answer to **two** significant figures.

Space for working.

..... %
[3]

(ii) Use the information in Table 2.1 to plot a line graph on the grid to show the effect of temperature on the rate of photosynthesis.

View solution



[4]

(iii) Describe the pattern shown by the data in your graph.

View solution

.....

.....

.....

.....

..... [2]

(iv) Use your graph to estimate the rate of photosynthesis when the temperature is 17 °C.

View solution

Show on your graph where you took your readings.

..... cm^3 per minute

[2]

(c) Fig. 2.2 is a photograph of one flower of an aquatic plant, *Cabomba caroliniana*.

View solution



magnification ×6

Fig. 2.2

(i) Make a large drawing of the flower shown in Fig. 2.2.

Label the stigma on your drawing.

[5]

(ii) Measure the length of line **XY** on Fig. 2.2.

View solution

length of line **XY** ..... mm

Calculate the actual width of the flower shown in Fig. 2.2 using your measurement and the formula.

$$\text{magnification} = \frac{\text{length of line } \mathbf{XY} \text{ on Fig. 2.2}}{\text{actual width of the flower}}$$

Include the unit.

Space for working.

.....
[3]

[Total: 23]

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