

# **Cambridge IGCSE**<sup>™</sup>

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

BIOLOGY 0610/53

Paper 5 Practical Test

May/June 2021

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

#### **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 [ ].

For Exam	For Examiner's Use				
1					
2					
Total					

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

1 Vitamin C is an important component of a balanced diet. Many health drinks contain vitamin C.

You are going to estimate the concentration of vitamin C in a health drink by comparing it to solutions with known concentrations of vitamin C.

DCPIP is an indicator for vitamin C. When added to a vitamin C solution, the blue DCPIP reacts with vitamin C and becomes colourless. Drops of DCPIP are added to the vitamin C solution until the solution remains blue.

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

You should use the safety equipment provided while you are carrying out the practical work.

- Step 1 Label four small beakers A, B, C and D.
- Step 2 Use the large syringe and the information in Table 1.1 to make the vitamin C solutions in the four labelled beakers.

Table 1.1

beaker	volume of 1.00% vitamin C solution/cm <sup>3</sup>	volume of water/cm <sup>3</sup>	final percentage concentration of vitamin C
Α	1	3	0.25
В	2	2	0.50
С	3	1	
D	4	0	1.00

(a)	(i)	Complete	Table	1.1	by	calculating	the	final	percentage	concentration	of	vitamin	С	in
		beaker C.												

0/	[4]
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- Step 3 Label four test-tubes A, B, C and D and place them in a test-tube rack.
- Step 4 Use the small syringe to transfer 0.5 cm<sup>3</sup> of vitamin C solution from beaker **A** to test-tube **A**.
- Step 5 Repeat step 4 using beaker **B** and test-tube **B**.
- Step 6 Repeat step 4 using beaker **C** and test-tube **C**.
- Step 7 Repeat step 4 using beaker **D** and test-tube **D**.
- Step 8 Fill the dropping pipette with the **DCPIP** solution.

Step 9 Put one drop of DCPIP into test-tube **A** and swirl gently to mix.

The blue colour should disappear as the vitamin C reacts with the DCPIP. You will be counting the number of drops of DCPIP you put into the test-tube.

- Step 10 Repeat step 9 until the blue colour does **not** disappear and the solution remains blue.
- Step 11 Record, in your table in **1(a)(ii)**, the total number of drops of DCPIP you have put into test-tube **A**.
- Step 12 Repeat step 8 to step 11 with test-tubes **B**, **C** and **D**.
  - (ii) Prepare a table to record your results.

(iii)	State a conclusion for your results.
	[1]
Step 13	Label a clean test-tube <b>H</b> .
Step 14	Use the small syringe to put $0.5\mathrm{cm}^3$ of health drink $\mathbf{H}$ into test-tube $\mathbf{H}$ .
Step 15	Add drops of DCPIP and swirl gently until the colour in the test-tube remains blue.
(iv)	Record the number of drops of DCPIP you added to test-tube <b>H</b> .
	drops [1]
(v)	Estimate the percentage concentration of vitamin C in health drink ${\bf H}$ using your results from ${\bf 1(a)(ii)}$ and ${\bf 1(a)(iv)}$ .
	% [1]

[4]

	(vi)	Identify <b>two</b> variables that were kept constant in this investigation.
		1
		2[2]
(	(vii)	Explain why it was important to swirl the contents of the test-tube after adding each drop of DCPIP in step 9.
		[1]
(b)	Rep	eating the investigation would improve the method used.
		gest $two$ other improvements to the method that would allow a more accurate estimation ne concentration of vitamin C in health drink $f H$ .
	1	
	2	
		[2]
(c)	Exp	lain why counting the number of drops of DCPIP is not accurate.
		[1]

(d)	The manufacturers of health drink <b>H</b> claim that it also contains protein and glucose.
	Describe how you would test health drink <b>H</b> for protein and glucose.
	Include the results for a positive test.
	protein
	glucose

[Total: 19]

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2	(a)	You are provided with the leaf of a plant, L1	١.
---	-----	---	----

	(i)	Make a	large	drawing	of leaf	f I 1
- 1	11/	iviant a	ıaıyc	urawing	UI ICAI	

[4]

(ii)	Measure the length of your drawing in 2(a)(i). Include the unit.
	Indicate on your drawing where you measured this length.
	length of the leaf in your drawing
	Measure the actual length of the leaf <b>L1</b> . Include the unit.
	actual length of leaf <b>L1</b>
	Calculate the magnification of your drawing using the equation:
	magnification = $\frac{\text{length of the leaf in your drawing}}{\text{actual length of leaf } \mathbf{L1}}$

.....[3]

**(b)** A student used an aquatic plant to investigate the effect of carbon dioxide concentration on the rate of photosynthesis. The production of oxygen gas can be used as an estimate of the rate of photosynthesis.

The student set up the apparatus shown in Fig. 2.1. He counted the number of bubbles produced in 5 minutes. The carbon dioxide concentration in the water around the aquatic plant was 2 mg per dm<sup>3</sup>.

He repeated the experiment with five different concentrations of carbon dioxide.

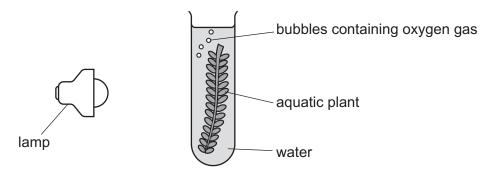


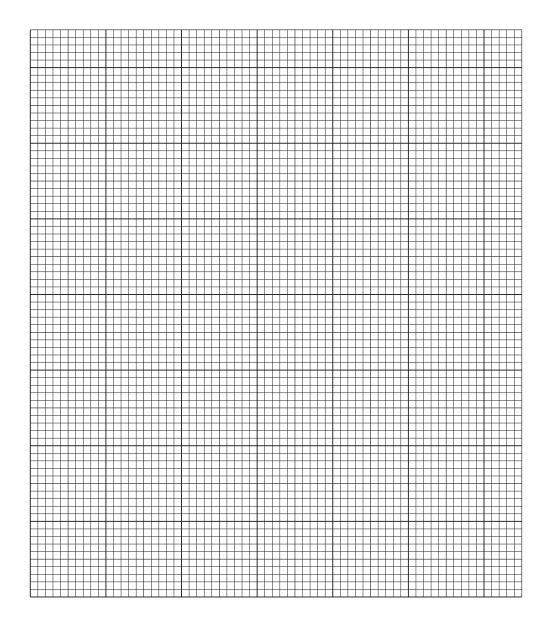
Fig. 2.1

The student's results are shown in Table 2.1.

Table 2.1

carbon dioxide concentration / mg per dm <sup>3</sup>	number of bubbles produced in 5 minutes
2	4
4	14
6	20
8	25
10	35
12	35

(i) Plot a line graph on the grid of the data in Table 2.1.



		[4]
(ii)	Describe the trend shown on your graph in 2(b)(i).	
		[4]

	(iii)	The rate of photosynthesis can be given as the number of bubbles produced in one minute.
		Use the information in Table 2.1 to calculate the rate of photosynthesis at a carbon dioxide concentration of $4\mathrm{mg}$ per $\mathrm{dm}^3$ .
		Give your answer to <b>one</b> significant figure.
		Space for working.
		bubbles per minute [2]
	(iv)	Identify the variable that the student changed in this investigation (the independent variable).
		[1]
(c)		unting bubbles is not an accurate method for measuring the volume of gas produced by a not during photosynthesis.
	You	n an investigation to determine the effect of light intensity on the rate of photosynthesis. r plan should include a more accurate method of measuring the volume of gas produced ng the reaction.

[Total: 21]

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