

Surname	Centre Number	Candidate Number
First name(s)		2



GCE A LEVEL

1400U50-1A



S24-1400U50-1A

WEDNESDAY, 1 MAY 2024

BIOLOGY – A2 unit 5

Practical Examination

Experimental Task

TEST 1

2 hours

For Teacher's use only	
Award a mark of 0 or 1 for the following	
Making dilutions of solution	

For Examiner's use only	
Mark Awarded	
Total	

ADDITIONAL MATERIALS

A calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Pencil may be used to draw tables and graphs.

Write your name, centre number and candidate number in the spaces at the top of this page.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

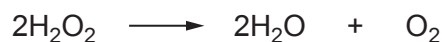
The total number of marks available for this task is 20.

Your teacher will directly assess your practical skills.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for orderly presentation in your answers.

1. Hydrogen peroxide (H_2O_2) is produced as a by-product of cellular aerobic respiration. It is toxic at high concentrations and is immediately broken down in cells by the enzyme catalase. This enzyme catalyses the decomposition of hydrogen peroxide into water and oxygen as seen in the equation below:



Catalase is stored in the cells of many living organisms. The rate of this reaction can be investigated by using freshly cut plant material and hydrogen peroxide solution.

Follow these instructions carefully

You are provided with:

eye protection
150 cm³ 20 vol hydrogen peroxide
distilled water
2 × 10 cm³ measuring cylinders
2 × 50 cm³ measuring cylinders
5 × boiling tubes in a rack
1 × forceps
paper towels
1 × piece of potato
1 × scalpel/knife
pestle and mortar
ruler
1 × white tile
2 × dropping pipettes
filter paper discs
1 × stirring rod
beaker of water for washing forceps / stirring rod
marker pen
stopwatch

YOUR TEACHER WILL BE OBSERVING YOUR EXPERIMENTAL TECHNIQUE.

Method

1. Label the five boiling tubes with the hydrogen peroxide concentrations of 2 vol, 5 vol, 10 vol, 16 vol and 20 vol.
2. Wear eye protection.
3. Using the **appropriate size** measuring cylinders, make up dilutions of hydrogen peroxide in the boiling tubes, using the 20 vol hydrogen peroxide and distilled water, as shown in **Table 1**.

Separate measuring cylinders should be used to measure the hydrogen peroxide and distilled water.

Table 1

Hydrogen peroxide concentration / vol	Volume of 20 vol hydrogen peroxide / cm ³	Volume of distilled water / cm ³
2	4	36
5	10	30
10	20	20
16	32	8
20	40	0

4. Use the stirring rod to mix the solution in each boiling tube. Wash the stirring rod between each use.
5. Using the scalpel/knife and the ruler, measure and cut a 2 cm length of potato. Cut this piece of potato into small pieces.
6. Place the potato into the mortar and add 5 cm³ distilled water. Grind the potato into a paste with the pestle.
7. Using the forceps, dip **one** filter paper disc into the potato paste. Remove the disc and blot it on a paper towel to remove excess liquid.
8. Using the forceps, drop the disc onto the surface of the 2 vol hydrogen peroxide solution and start the stopwatch as soon as it touches the solution. (If the disc remains at the surface, use the forceps to push it just below the surface.)
9. Record the time taken, in seconds, for the disc to fall and rise to the surface again.
10. Wash the forceps in the washing beaker.
11. Use the forceps to remove and discard the disc from the tube.
12. Wash the forceps again.
13. Using a **new paper disc** each time and the same boiling tube of hydrogen peroxide solution, repeat steps 7–12 twice more to obtain a total of three readings for this concentration of hydrogen peroxide.
14. Repeat steps 7–13 for **each** of the 5 vol, 10 vol, 16 vol and 20 vol hydrogen peroxide solutions.

Rough results:

Use the space below to record the time taken in seconds for the filter paper disc to fall and rise to the surface for the three readings at each hydrogen peroxide concentration. Calculate the mean time for each concentration of hydrogen peroxide.

- (a) Construct a suitable table to show all of your data, including the mean time taken for the disc to sink and rise to the surface at each concentration of H_2O_2 . [4]

- (b) Draw a graph to show the mean time taken for the filter paper discs to fall and rise against the concentration of hydrogen peroxide. **Include range bars on the graph.** [7]

Examiner
only



- (c) (i) Describe the trend shown in your graph and use your range bars to comment on the consistency of your results. [2]

.....

.....

.....

.....

.....

.....

- (ii) Suggest a suitable control for this experiment and describe the expected results. State the purpose of this control experiment. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (iii) A student suggested that an improvement would be to use a pH7 buffer instead of water when making the potato paste in step 6 of the method. Explain why this would be an improvement to the original method. [2]

.....

.....

.....

.....

.....

- (d) Catalase is found in many human tissues. There is a hereditary condition in humans called acatalasemia, which results in low catalase production. Explain why this condition could result in tissue damage in the human body. [1]

Examiner
only

19

END OF PAPER

BLANK PAGE