



GCE A LEVEL

1400U50-1D



**To be opened on WEDNESDAY, 24 APRIL 2024
by TEACHERS/TECHNICIANS**

**BIOLOGY – A2 unit 5
Practical Examination**

**Experimental Task
TESTS 1 and 2**

SETTING UP INSTRUCTIONS

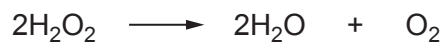
Confidential

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This document should be stored securely by the exams officer when not in use by the teacher. This document must not be stored within the science department when not in use by the teacher/technician. Its contents should not be divulged except to those concerned with the preparation of the assessment.

TEST 1

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.

Test 2

As Test 1 but candidates will be producing different concentrations of hydrogen peroxide.

Hydrogen peroxide concentration/vol	Volume of 20 vol hydrogen peroxide/cm ³	Volume of distilled water/cm ³
2	4	36
4	8	32
8	16	24
16	32	8
20	40	0

Teacher/Technician notes For Test 1 and 2:

Hydrogen peroxide solution

The 20 vol hydrogen peroxide should be made fresh from 100 vol stock solution up to a week before the practical exam. It should be stored in a cool, dark place.

The 20 vol hydrogen peroxide solution is an irritant but is not classified as hazardous once it has been diluted below 18 vol. The 20 vol solution given to candidates should be labelled "irritant".

Candidates will be making their own solutions of hydrogen peroxide from the 20 vol solution.

Preparation of potato

Ensure potatoes are fresh.

The potato pieces should be cut with a 1 cm chipper or a number 4 or 5 cork borer. Each candidate will need approximately a 3 cm length of potato. The potato pieces should be prepared on the morning of the assessment. They should not be stored in water.

Equipment

The test tube racks should allow the candidates to see the top of the solution level when 40 cm³ of solution is in each boiling tube.

Filter paper discs should be cut using a hole punch and separated out. Each candidate should be provided with at least 20 filter paper discs.

The dropping pipettes are required for accurate measurement when candidates are producing the hydrogen peroxide solutions. It is acceptable to inform the candidates of this.

Please advise candidates that in some concentrations the disc may not sink all the way to the bottom and this is not a problem. They should just record the time for it to fall and rise to the surface again.

PLEASE NOTE

If a candidate has not been able to collect a full set of data by one hour after the start of the assessment, the teacher should provide data in an unstructured form for analysis. There is no penalty for this but the work should be annotated to this effect. Please also ensure that the data provided is sent to the examiner with the candidate's script.

Awarding of teacher assessed marks

Making dilutions	<p>Award 1 mark if both of the following are seen once: any volume smaller than 10 cm³ is measured using the 10 cm³ measuring cylinder and the volume measured at eye level with the measuring cylinder placed on the bench.</p>
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It is recommended that teachers enter the teacher assessed marks on the front of the candidates exam papers after candidates have completed the practical.

Please ensure that the "Information required from centres" sheet is completed and given to the exams officer to be sent to the examiner with the completed examination papers.



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BIOLOGY – A2 unit 5 Practical Examination

Experimental Task

INFORMATION REQUIRED FROM CENTRES

Centre Number

(Please detach and send with the completed examination papers to the **examiner.**)

TEST 1

Teacher results:

Concentration of hydrogen peroxide/Vol	Time taken for filter paper disc to fall and rise/s			
	1	2	3	Mean
2				
5				
10				
16				
20				

TEST 2 (if applicable)

Teacher results:

Concentration of hydrogen peroxide/Vol	Time taken for filter paper disc to fall and rise/s			
	1	2	3	Mean
2				
4				
8				
16				
20				

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