

S.3 MID TERM TWO BIOLOGY EXAMINATION

TIME: ONE HOUR FORTY FIVE MINUTES

1. A piece of a plant material and animal material was put in two different test tubes containing colourless liquid and bubbles were formed in the presence of distilled water whose pH is 7. When both tissues were **BOILED** and placed in another set of colourless liquid from the same source, **NO BUBBLES** were formed. When another piece of the same plant and animal material was put in two different test tubes containing colourless liquid and bubbles were **NOT** formed in the presence of **hydrochloric acid** in one test tube and **sodium hydroxide** in the other test tube.

*From what you have learnt about enzymes under the theme: **Nutrition in Organisms**, you are expected to attempt all the following questions.*

(a) Name a plant material and animal material that can produce LOTS of bubbles when placed in a test tube containing **THAT** colourless liquid in the presence of distilled water. (2 marks)

Plant material.....

Animal material.....

(b) What active ingredient is present in both of the plant and animal material that cause the bubbles to be formed with **THAT** colourless liquid? (1 mark)

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(c) What is the exact name of **THAT** colourless liquid that form bubbles with the plant and animal material?

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(d) Why does the plant and animal material form bubbles with **THAT** colourless liquid in the presence of distilled answer. (Include pH in your answer). (2 marks)

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(e) What happens when the plant material is cooked and eaten but some is put in **THAT** colourless liquid? *Give only one reason to your answer.* (3 marks).

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(f) Basing your competency on question 1 (d), explain the following observation.

(i) No bubbles formed in the presence of hydrochloric acid. (3 marks)

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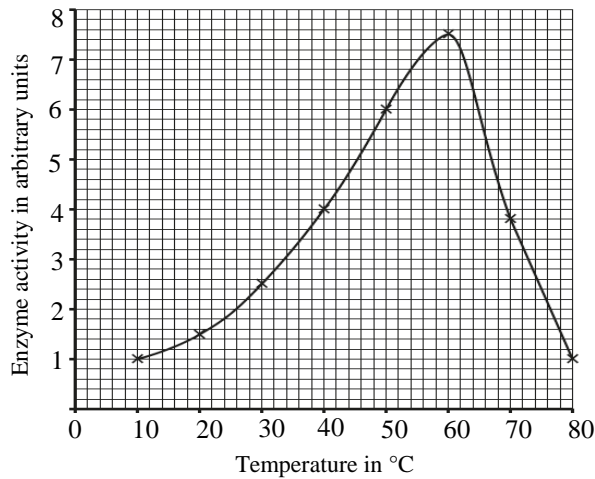
(ii) No bubbles formed in the presence of sodium hydroxide. (3 marks)

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(g) The enzyme Savinase is a protease used in many biological detergents. Biological detergents are used to wash clothes. The grid on the graph below shows the effect of temperature on the activity of Savinase.



(i) Use the grid to find the optimum temperature for Savinase activity. (1 mark)

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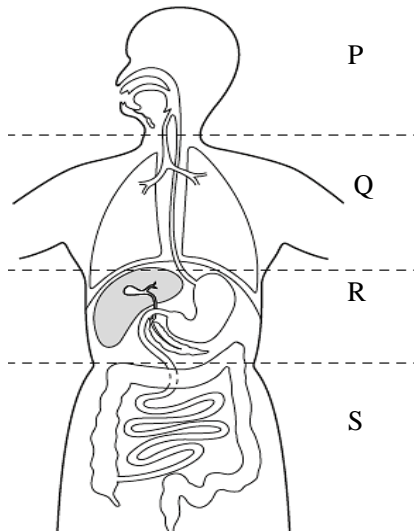
(ii) Suggest why Savinase is added to biological detergents. (4 marks)

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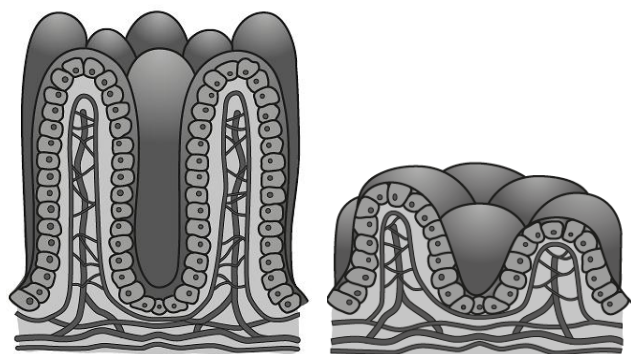
2. The diagram below shows a section through the human body divided into regions P, Q, R and S.



(a) Complete the table below by matching the letters from the diagram to the statements in the table. *There may be one or more than one letter for each statement.* (6 marks)

Contains an organ which	Region or regions
... produces an acidic secretion	R
... contains villi	
... digests protein	
... produces insulin	
... contains bronchi	
... secretes amylase	
... ingests food	

(b) In a disease that affects a small number of people, the surface through which the products of digestion are absorbed into the blood changes. This change is shown in the diagrams below. Both diagrams are drawn to the same scale.



Describe the change in the absorption surface in a person affected by the disease and suggest ways in which the person may be affected by this change.

Change in absorption surface. (4 marks)

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Ways in which person may be affected. (4 marks)

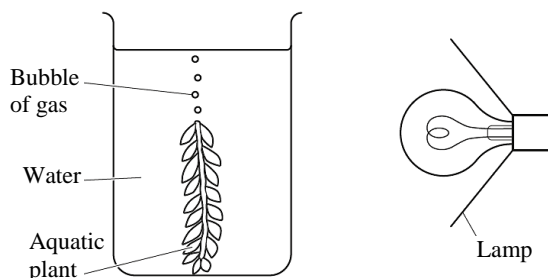
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SECTION B

3. Some students investigated the effect of light intensity on the rate of photosynthesis. A piece of the stem of the aquatic plant was placed in a beaker with the cut end uppermost and covered with water. In a dark room, a lamp was used to shine light on it. Bubbles of gas were seen coming out of the cut end of the stem as the plant photosynthesized.

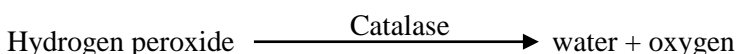
The apparatus is shown in the diagram on the top right of this page.



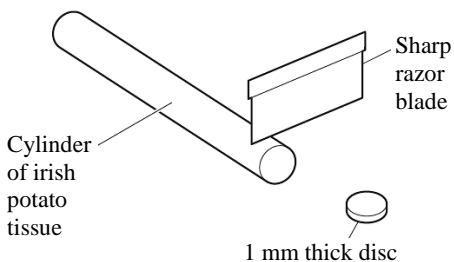
They left the plant for five minutes. After five minutes they counted the number of bubbles of gas given off in one minute. They varied the light intensity by moving the lamp to different distances from the plant, and repeated the process.

- (a) Explain why the students placed the apparatus in a dark room. (5 marks)
- (b) State one factor that the students should control in this investigation. Explain how the students could control this factor. (5 marks)
- (c) Explain how the students could ensure that the result for each light intensity was reliable. (5 marks)
- (d) Explain why the plant was left for five minutes at each light intensity before counting bubbles. (5 marks)

4. Catalase is an enzyme found in most living organisms. It catalyzes the breakdown of hydrogen peroxide to water and oxygen.



Potato tissue contains catalase. When a thin disc of potato is dropped into a test-tube containing hydrogen peroxide solution, it first sinks to the bottom. As oxygen is produced, bubbles form on the potato disc that make it float to the surface. Some students did an experiment to find the activity of potato catalase on different concentrations of hydrogen peroxide solution. 1 mm thick discs were cut from the end of a cylinder of potato tissue as shown in the diagram below.



One disc was dropped into a test-tube containing 15 cm^3 of 1% hydrogen peroxide solution. A stop-watch was started immediately and the time taken for the disc to reach the surface of the solution was recorded. The time was rounded to the nearest whole second.

A second disc was then dropped into the test-tube and the time taken for it to reach the surface recorded. This process was repeated with a third disc. The experiment was then repeated with a test-tube containing 15 cm^3 of 2% hydrogen peroxide solution.

The results are shown in the table below. The procedure was repeated with a test-tube containing 15 cm^3 of 3% hydrogen peroxide solution. The times recorded were 8.3, 6.9 and 9.1 seconds.

Percentage concentration of hydrogen peroxide solution	Time taken for potato disc to reach surface of hydrogen peroxide solution in seconds			
	disc 1	disc 2	disc 3	Mean
1	30	26	34	
2	12	14	13	
3	32	28	37	

(a) (i) Complete the table by entering the results for 3% hydrogen peroxide solution (*rounded to the nearest whole second*) and calculating the means. Hydrogen peroxide is a harmful or irritating substance. (3 marks)

(ii) State two precautions you would take when using hydrogen peroxide in an experiment. (5 marks)

(iii) State what equipment the students could use to measure 15 cm^3 of hydrogen peroxide solution. (1 marks)

(iv) Describe the effect of increasing the concentration of hydrogen peroxide solution on the time taken for the potato discs to float. (10 marks)

v) Explain what the students could do to make their results more reliable. (5 marks)

(vi) Suggest one possible source of error in the method used in this experiment. Explain why this could have affected the results. (2 marks)

END

***COMPETENCY-BASED QUESTIONS APPROACHES
FOR S.3 BY PROFESSOR GIDEON ALEXANDER***