BIOLOGY MIND

# Edexcel

## A-Level

# BIOLOGY

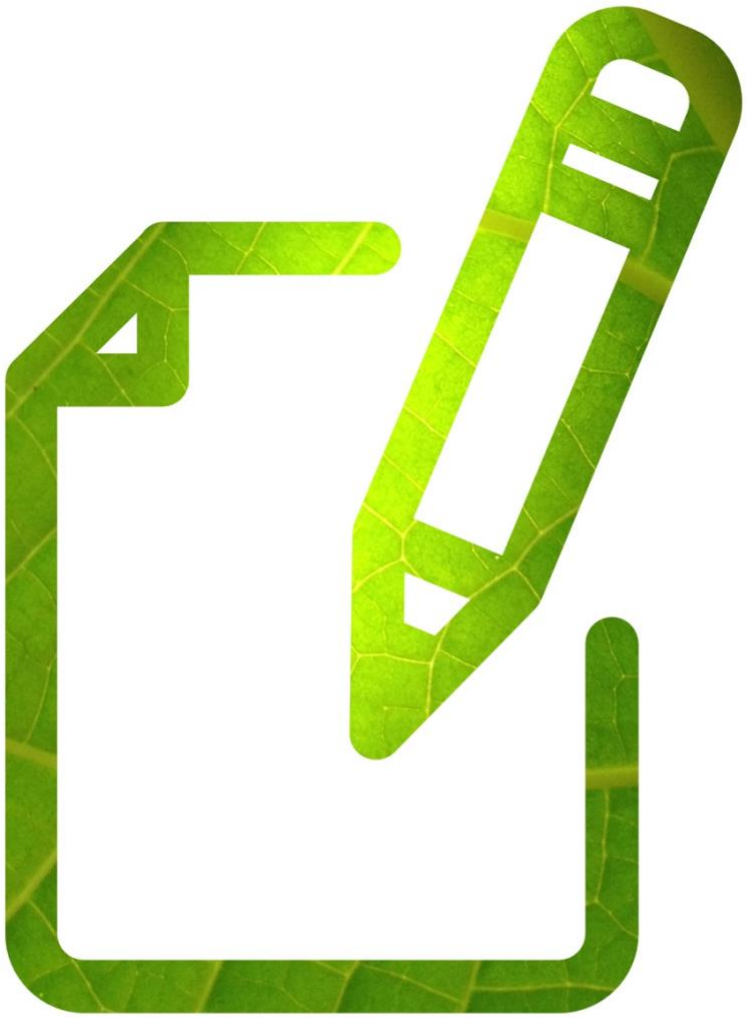
Biological Molecules

Enzymes 4

Time allowed

**38 minutes**

**QUESTION PAPER**



| Score | Percentage |
| --- | --- |
| /32 | % |

**1** Enzymes act as biological catalysts.

Amylase is an enzyme present in saliva that catalyses the hydrolysis of starch into maltose.

*(a) Describe the structure of starch.

**(5)**

(b) Explain the meaning of the following terms.

(i) Catalyst

**(2)**

(ii) Hydrolysis

**(2)**

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(c) Bread contains a high proportion of starch. If bread is chewed for a long period of time it begins to taste sweet.

Suggest why bread tastes sweet after chewing for a long period of time.

**(1)**

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**(Total for Question 1 = 10 marks)**

**2** Photosynthesis can be divided into two main stages, the light-dependent stage and the light-independent stage.

(a) Explain why the light-independent stage cannot take place without the light-dependent stage.

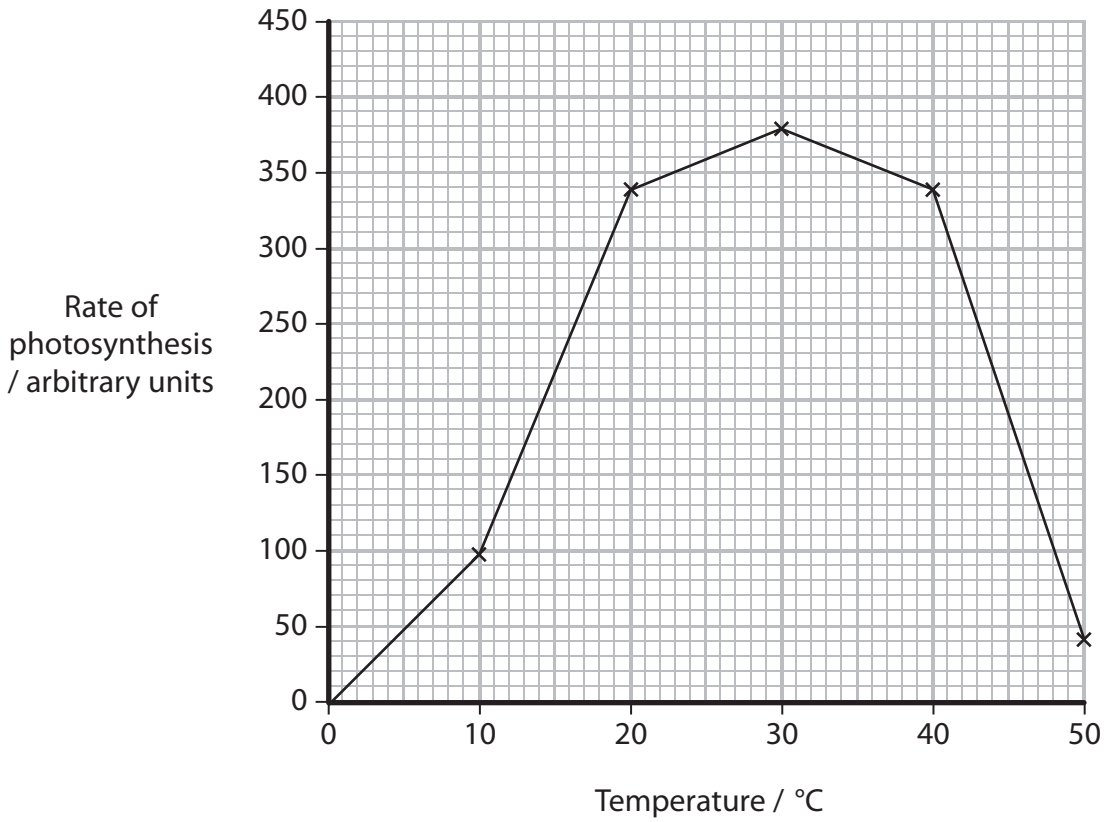
**(3)**

(b) An investigation was carried out by a student, to find the effect of temperature on the rate of photosynthesis in *Elodea canadensis* (Canadian pondweed).

The rate of photosynthesis was measured over a period of two hours at a fixed temperature. This was repeated at different temperatures.

All other abiotic factors were controlled.

The results of this investigation are shown in the graph below.




(i) Place a cross (☒) in the box next to the statement that describes what could be measured to find the rate of photosynthesis in this investigation.

**(1)**

☐ **A** increase in mass of *Elodea*

☐ **B** mass of nitrate absorbed

☐ **C** volume of carbon dioxide produced

☐ **D** volume of oxygen produced

(ii) The temperatures used in this investigation were 0°C, 10°C, 20°C, 30°C, 40°C and 50°C.

Suggest what the results of the investigation show about the minimum temperature required for photosynthesis in *Elodea*.
Give a reason for your answer.

**(2)**

(iii) Explain the meaning of the following statement.

"All other abiotic factors were controlled."

**(2)**

(iv) The student, who carried out this investigation, wrote the following as part of her conclusion.

Enzymes control the rate of photosynthesis in *Elodea*.

Discuss how far the results of this investigation support her conclusion.

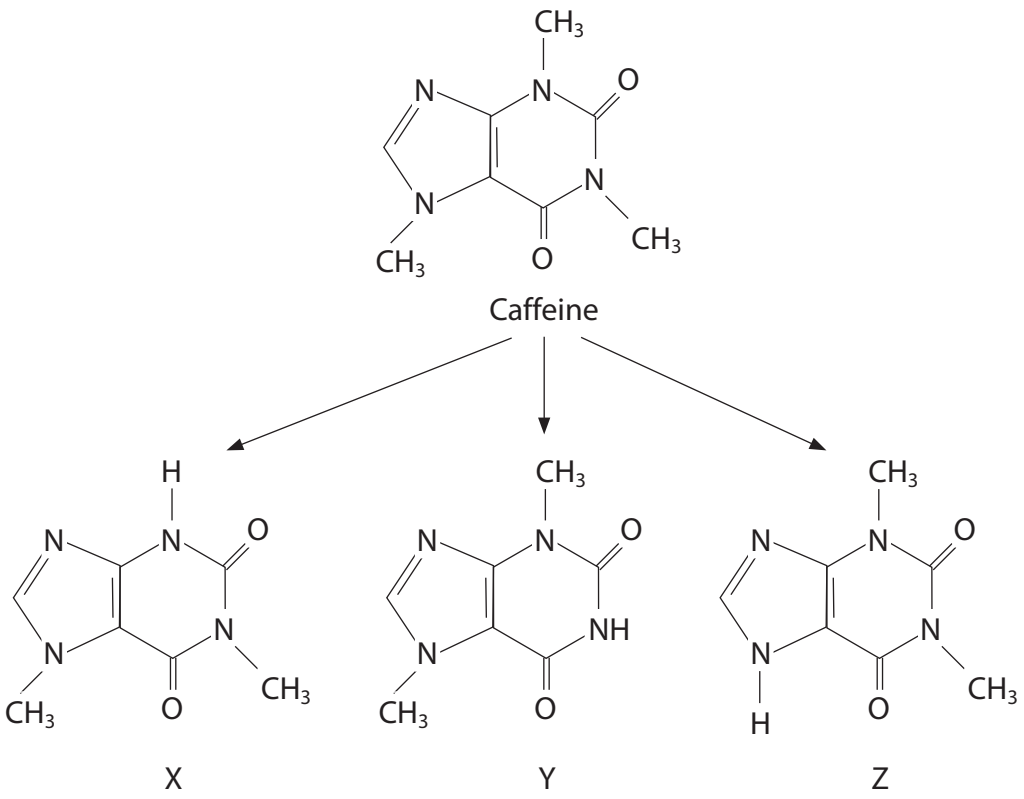
**(4)**

**(Total for Question 2 = 12 marks)**

**3** Caffeine is a drug frequently consumed in a number of drinks such as coffee, cola, hot chocolate and tea.

Caffeine is broken down in the liver by a group of enzymes called cytochrome P450 oxidase.

(a) The diagram below shows the structure of caffeine and its three breakdown products, X, Y and Z.




(i) Using the information in the diagram, give **two** reasons why caffeine is **not** an amino acid.

**(2)**

1 .....

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2 .....

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(ii) Using the information in the diagram, state **two** differences between the breakdown products.

**(2)**

1 .....

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2 .....

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(iii) Using the information in the diagram and your own knowledge of enzyme action, suggest why cytochrome P450 oxidase consists of more than one type of enzyme.

**(3)**

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(b) A student decided to investigate the concentration of caffeine in four drinks: coffee, cola, hot chocolate and tea.

The student's results are shown in the table below.

| Drink | Volume of drink | Caffeine content / mg |
|---|---|---|
| coffee | 200 $cm^3$ | 135 |
| cola | 1 can | 80 |
| hot chocolate | 200 $cm^3$ | 10 |
| tea | 1 cup | 50 |

The student made two conclusions from these results.

Conclusion 1 "Different drinks have different concentrations of caffeine."

Conclusion 2 "Coffee has the highest concentration of caffeine."

Comment on the validity of these conclusions. Give reasons for your answer.

**(3)**

Conclusion 1 .....

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Conclusion 2 .....

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**(Total for Question 3 = 10 marks)**