5090 Biology Paper 2 - Enzymes

Topical questions | 4 questions

1. Question part 1/2 | 5090 Oct-Nov 2023 P2 V2 Q5

5 A student investigates the use of an enzyme in fruit juice production.

The student carries out the following steps:

- cuts one apple into small pieces
- puts the same number of pieces into each of three beakers, **A**, **B** and **C**
- adds 2 cm^3 of a dilute enzyme solution to the apple in beakers **A** and **B**
- adds 2 cm^3 of distilled water to the apple in beaker **C**
- places each beaker in a water-bath at a constant temperature for 30 minutes
- filters the juice from each beaker into a separate measuring cylinder and records the volume of juice collected in each measuring cylinder.

(a) **(i)** Identify the enzyme that the student should add to the apple in beakers **A** and **B**.

..... [1]

(ii) Outline the reason why the student set up beaker **C**.

.....

..... [1]

1. Question part 2/2 | 5090 Oct-Nov 2023 P2 V2 Q5

(b) The results of the student's investigation are shown in Table 5.1.

Table 5.1

beaker	temperature of water-bath / °C	volume of juice collected / cm^3
A	45	20
B	90	5
C	45	5

Use your knowledge of enzyme action to explain these results.

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..... [5]

(c) Bacteria can be genetically modified to produce enzymes for use in biotechnology.

State **two** reasons why bacteria are suitable for this purpose.

1 .....

2 .....

[2]

[Total: 9]

2. Question | 5090 Oct-Nov 2024 P2 V1 Q2

2 Maltase is an enzyme found in the intestines of vertebrates, including humans.

(a) Complete Table 2.1, which provides descriptions of words related to the activity of maltase. The first row has been completed for you.

Table 2.1

word	how it relates to the activity of maltase
maltase	an enzyme that is found in vertebrate intestines
	the substrate of maltase
glucose	
	part of the maltase molecule which fits the substrate
specific	

[4]

(b) Vampire bats live in South America and feed entirely on blood.
They are the only known vertebrates which do **not** have maltase in their intestines.
Suggest an explanation for this.

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..... [2]

[Total: 6]

3. Question part 1/2 | 5090 May-June 2025 P2 V2 Q5

5 *Rhizomucor pusillus* is a fungus found in piles of dead plant vegetation. It has an optimum growth rate between 60 °C and 70 °C.

(a) (i) Identify the name of the kingdom and genus of this organism.

kingdom .....

genus .....

[1]

(ii) Give **two** of the main features of organisms classified in the kingdom named in **(a)(i)**.

1 .....

2 .....

[2]

(iii) Explain how piles of dead plant vegetation can have temperatures much higher than the surrounding environment.

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..... [4]

(b) This fungus produces an enzyme called pectinase. Scientists extracted pectinase from the fungus and investigated the effect of pH on its activity at 20 °C.

Fig. 5.1 shows a graph of their results.

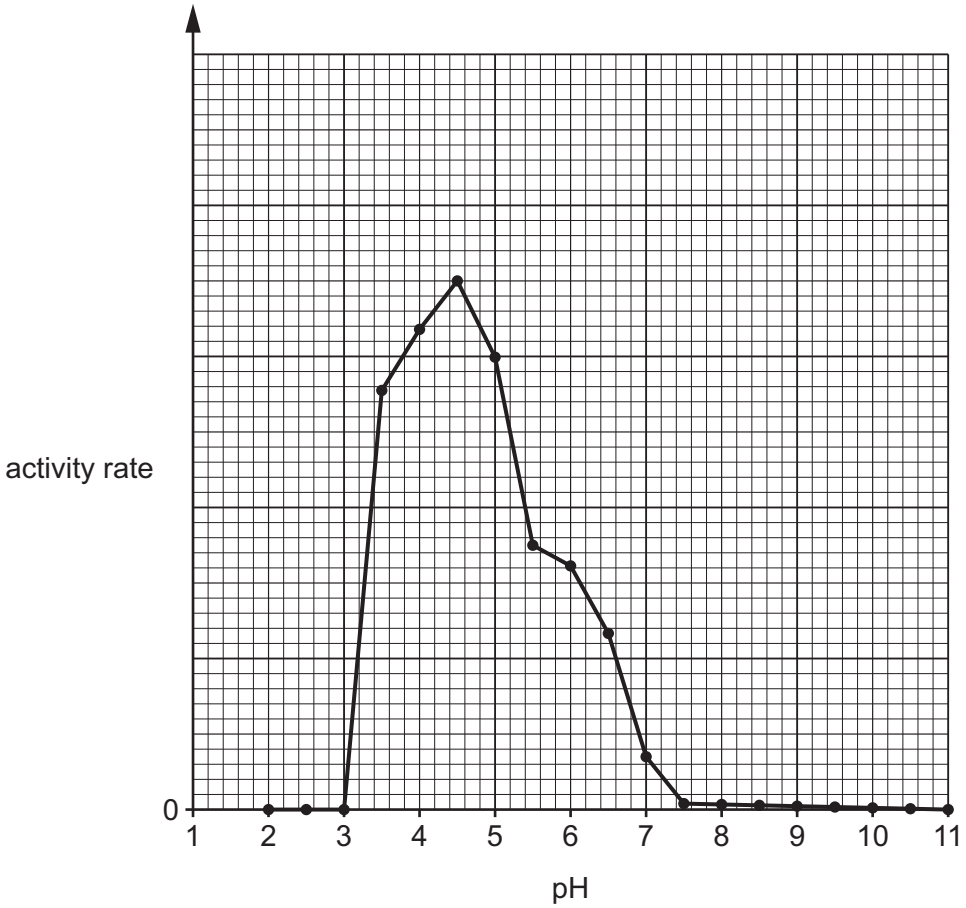

Fig. 5.1

(i) Explain the results for the pH range 2–7.

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..... [4]

(ii) The experiment was repeated at a temperature of 55 °C.

On Fig. 5.1, draw a graph to suggest the results expected at 55 °C. [1]

(iii) Name an industrial process that uses pectinase.

..... [1]

[Total: 13]

4. Question part 1/2 | 5090 Oct-Nov 2025 P2 V2 Q4

4 Lipases are enzymes produced by animals, plants and microorganisms. Lipases from different species can have different chemical structures.

(a) All enzymes are biological catalysts.

Explain what is meant by the term catalyst.

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..... [2]

(b) Lipase is a digestive enzyme in humans.

(i) Name an organ that secretes lipase into the duodenum.

..... [1]

(ii) Name the substrate and products of lipase.

substrate .....

products .....

[2]

(c) Some scientists collected species of bacteria from three different sources, **A**, **B** and **C**.

The scientists investigated how temperature affected the activity of the lipase produced by the bacteria collected from the three different sources. They wanted to find a source of lipase that could be used in biological washing powders.

Fig. 4.1 shows the results.

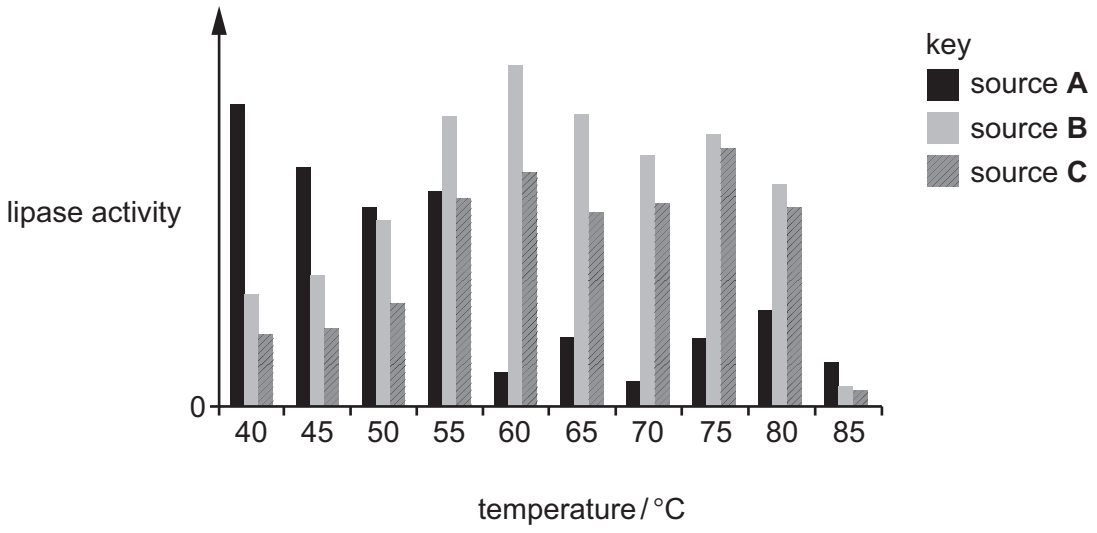

Fig. 4.1

(i) Using Fig. 4.1, discuss the results from this investigation.

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..... [3]

(ii) The lipase molecules produced by different species of bacteria have different chemical structures.

Explain:

- what determines the different chemical structures of lipase molecules
- why having different chemical structures can affect their activity at different temperatures.

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..... [3]

[Total: 11]