

AQA, OCR, Edexcel

A Level

A Level Biology

Enzyme Questions

Name:

M M E

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Total Marks: /45

Enzymes

Enzymes are often called biological catalysts and they are essential in maintaining the reactions that keep plants and animals alive.

1. The structure of an enzyme is essential to its function in both intracellular and extracellular environments.

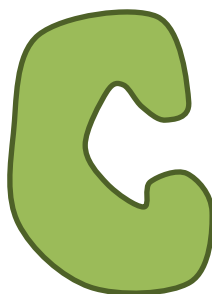
a)

i) What is meant by the term catalyst? (2 marks)

ii) What is meant by the activation energy of an enzyme and how does the presence of an enzyme affect it (2 marks)

iii) Enzymes are globular proteins, what does this mean in terms of quaternary structure? (2 marks)

- b) The diagram below is a simple drawing of the enzyme maltase.



Maltase

i) Why is the tertiary structure of maltase essential to its function? (3 marks)

ii) Use the image of the enzyme maltase to draw a sketch of the substrate that maltase breaks down and write the name of the molecule. (2 marks)

iii) How does the maltase enzyme interact with the molecule identified in 1.b.ii? (4 marks)

c) Early scientists who studied enzyme structure devised the 'lock and key' model of enzyme action, however scientists in the mid-20th Century used new evidence to devise the 'induced fit' model of enzyme action.

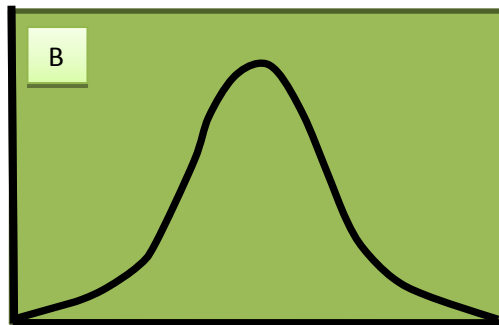
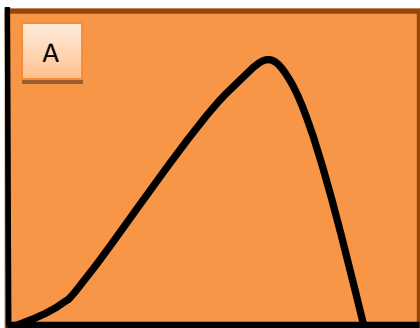
i) What is the 'lock and key' model of enzyme action? (2 marks)

ii) Why is the 'induced fit' model considered to be a better theory than the 'lock and key' model? (3 marks)

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2. Enzymes are biological molecules and so can be affected by altered external conditions.
- a) The two graphs below show how enzyme activity is altered by a change in an individual factor.

i) What is meant by the term denature? (2 marks)



ii) Using the graphs, identify what factor is affecting the rate of reaction and explain how it creates the shape of the graph. (6 marks)

- b) Concentration of both substances and enzymes also has an effect on the rate of reaction. Worldwide many adults are lactose intolerant which means that their bodies cannot produce lactose as part of the digestive process.

i) Lactose is broken down into what monomers? (2 marks)

ii) What is this type of reaction called? (1 mark)

- c) People who suffer from lactose intolerance need to drink milk containing pre-digested Lactose; this is done by adding the products directly to the milk.

i) How does adding more lactose enzyme increase the rate of reaction (3 marks)

ii) Draw a rough sketch of a graph, with labels, to show how the rate of reaction changes with an increase in enzyme concentration. (2 marks)

3. The rate of enzyme activity can be interfered with or prevented completely through the interaction of inhibitors.

a) i) What are the two different types of enzyme inhibitors? (2 marks)

ii) Which of the enzyme inhibitors in the answer to 3.a.i. would be more likely to have temporary effects and why? (3 marks)

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b) Cyanide is a poison that kills those who are exposed to it. Cyanide is a non-competitive inhibitor that acts by interfering with the Cytochrome C Oxidase in mitochondria of cells in the final stages of cellular respiration.

i) Explain how exposure to cyanide is lethal. (4 marks)