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2.4 Enzymes

Medium

BIOLOGY

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EXAM PAPERS PRACTICE

2.4 Enzymes

Question Paper

Course	DP IB Biology
Section	2. Molecular Biology
Topic	2.4 Enzymes
Difficulty	Medium

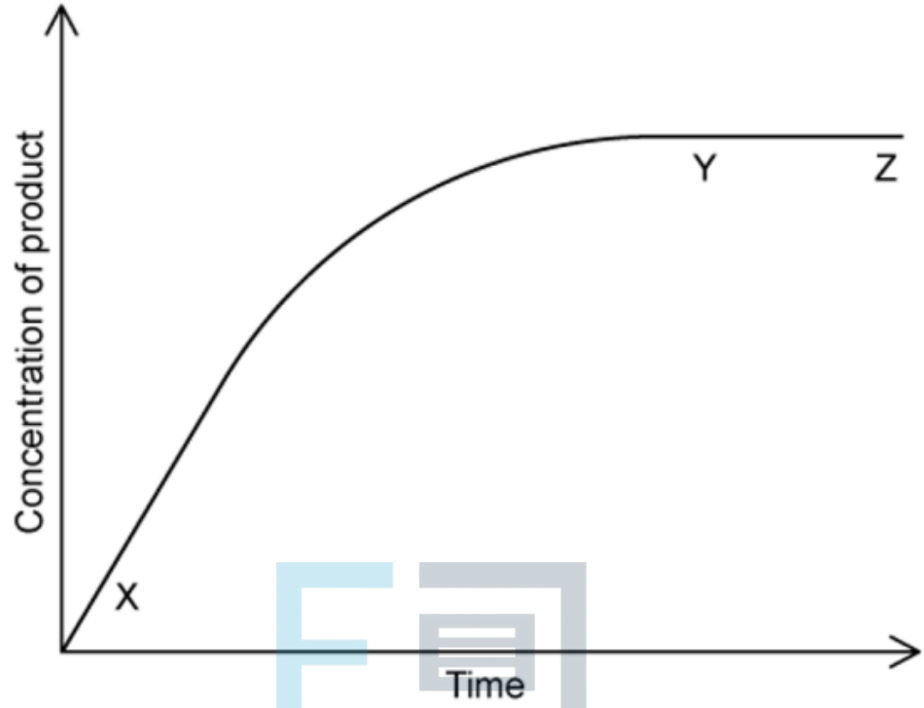
Time allowed: 20

Score: /10

Percentage: /100

Question 1

The graph shows the course of an enzyme-catalysed reaction at 25 °C.



Which statement about the graph is **incorrect**?

A At **X** the number of available substrate molecules is high.

B At **X** the number of enzyme/substrate complexes is the same as **Y**.

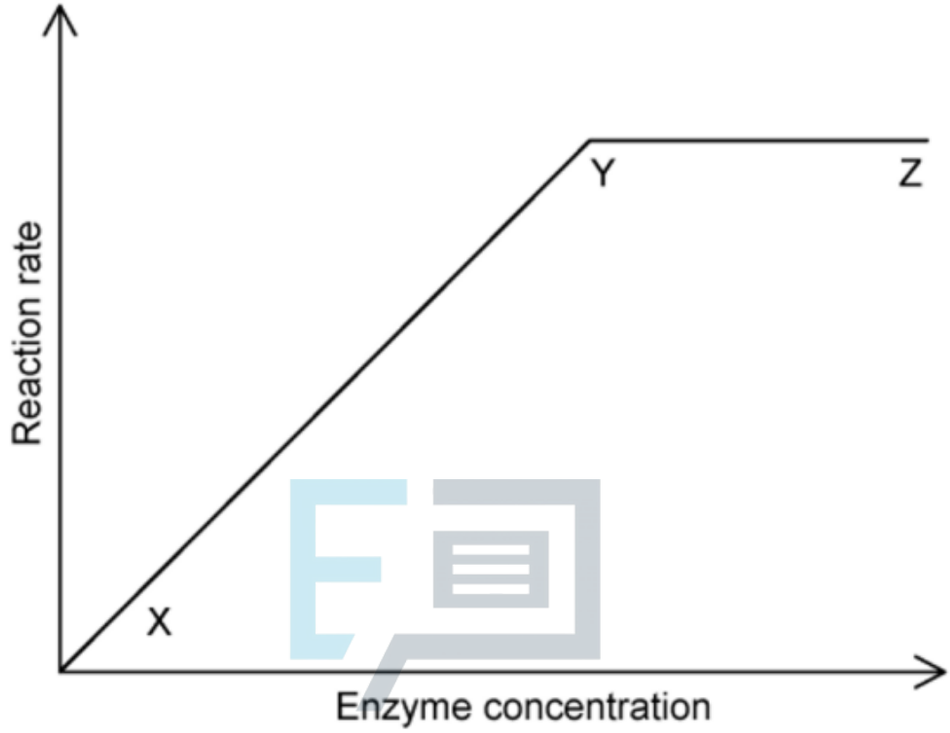
C At **Z** the number of available substrate molecules is low.

D At **Y** the number of enzyme/substrate complexes is the same as **Z**.

[1 mark]

Question 2

The graph shows the effect of enzyme concentration on the rate of an enzyme-controlled reaction. The substrate concentration is constant.



Which statement about the graph is correct?

A Between **X** and **Z,** the number of enzyme molecules is limiting.

B Between **Y** and **Z**, the number of enzyme molecules is limiting.

C Between **X** and **Z**, the number of substrate molecules is limiting.

D Between **Y** and **Z**, the number of substrate molecules is limiting.

Question 3

The following statements apply to enzyme-catalysed reactions. Which row of the table best describes the sequence of events in an anabolic reaction?

A	Substrates collide with enzyme	→	Enzyme-substrate complex forms	→	Bonds are newly-formed only	→	By-product diffuses away, product remains bound to the enzyme until the next collision
B	One substrate collides with the enzyme	→	Substrates and enzyme link temporarily	→	Bonds are broken only	→	Two products form and diffuse away
C	Substrates collide with enzyme	→	Substrates and enzyme link temporarily	→	Bonds are broken and new ones formed	→	Product and by-product diffuse away, enzyme is returned to its unreacted state
D	One substrate collides with the enzyme	→	Substrates and enzyme link temporarily	→	Bonds are broken and new ones formed	→	Two products form and diffuse away

[1 mark]

Question 4

Which statement below best describes the concept of enzyme-substrate specificity?

A. Enzymes and substrates fit together because they are the same type of biological molecule.

B. The enzyme's precise 3-D shape and chemical properties are compatible with the substrate allowing formation of enzyme-substrate complexes.

C. An enzyme can adapt its active site to fit a range of substrates to give maximum catalytic ability.

D. Projections on the enzyme's surface match projections on the substrate's surface.

[1 mark]

Question 5

When investigating the rate of reaction of the enzyme lipase on the hydrolysis of triglycerides, the pH must be maintained to prevent the lipase denaturing.

Why might fluctuations in pH occur?

A The products of hydrolysis will decrease the pH.

B Lipase has a very low optimum pH.

C The products of hydrolysis will increase the pH.

D The water molecules produced as a byproduct of hydrolysis decreases pH.

[1 mark]

Question 6

The breakdown of hydrogen peroxide to water and oxygen is catalysed by the enzyme catalase. In an investigation into the effect of temperature on the rate of reaction of catalase, mashed liver (which contains catalase) was added to hydrogen peroxide.

What would the independent variable be in this experiment?

A The change in mass of the liver after a given time.

B The temperature of the solution.

C The mass of liver added at the start.

D The volume of oxygen produced.

[1 mark]

Question 7

Which of the following statements about enzymes is **not** correct?

A They can have multiple active sites.

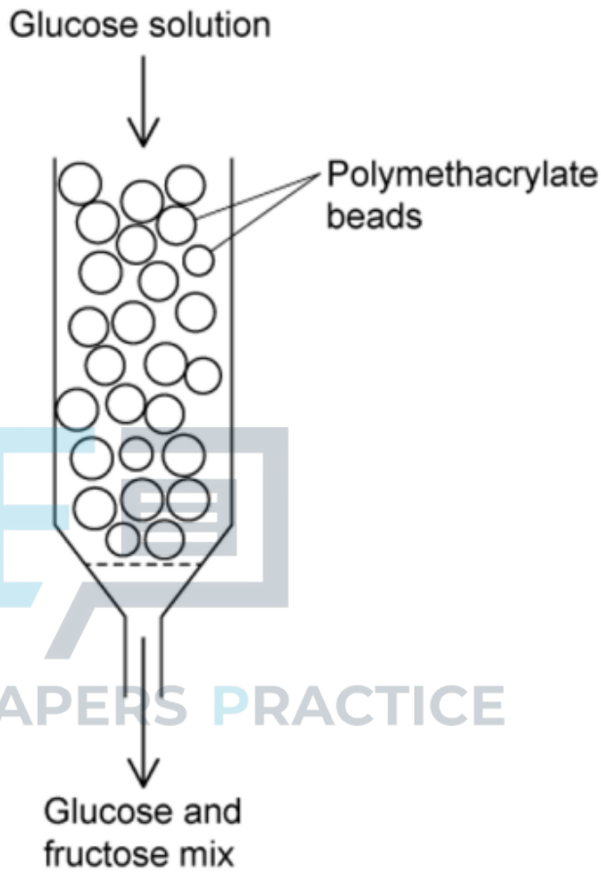
B They are composed of one (or more) polypeptide chain(s).

C Ester bonds play an important role in maintaining shape.

D They catalyse both anabolic and catabolic reactions.

Question 8

A bacterial enzyme from the species *Caldicoprobacter algeriensis* can be immobilised onto polymethacrylate beads for the conversion of glucose into fructose in the food industry, as shown in the diagram below.



What is the name of the enzyme that is immobilised on the polymethacrylate beads?

What is the name of the enzyme that is immobilised on the polymethacrylate beads?

A Glucose isomerase.

B Fructose convertase.

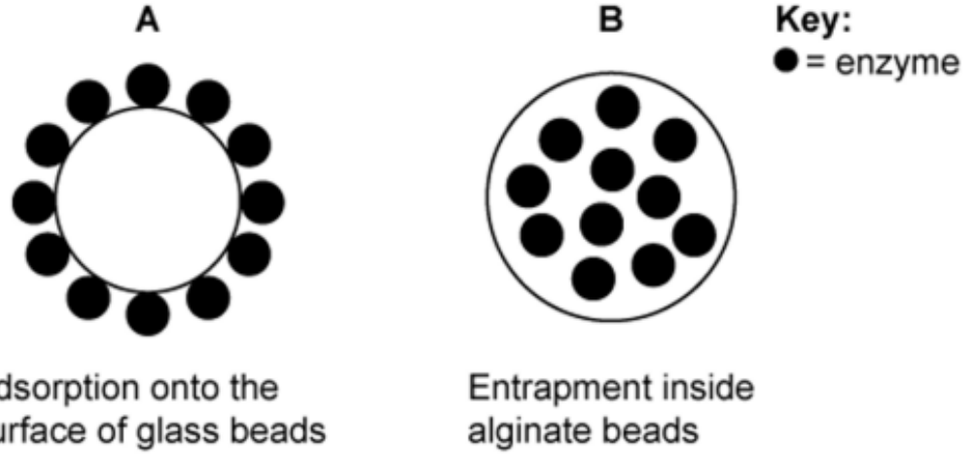
C Fructose isomerase.

D Glucose convertase.

[1 mark]

Question 9

Enzymes can be immobilised in various ways. The diagram below shows two different ways of immobilisation.



Immobilised lactase enzymes are used to make milk digestible for lactose intolerant people. A student carried out an investigation to compare the activity of the enzyme lactase that had been immobilised in the two different ways shown.

A solution containing 50 mg cm^{-3} of lactose was poured through a column containing the immobilised enzyme.

What would be the best choice of dependent variable for this experiment?

A The concentration of lactose in the solution before pouring through the column.

B The concentration of glucose in the milk after pouring through the column.

C The concentration of enzyme remaining in the column.

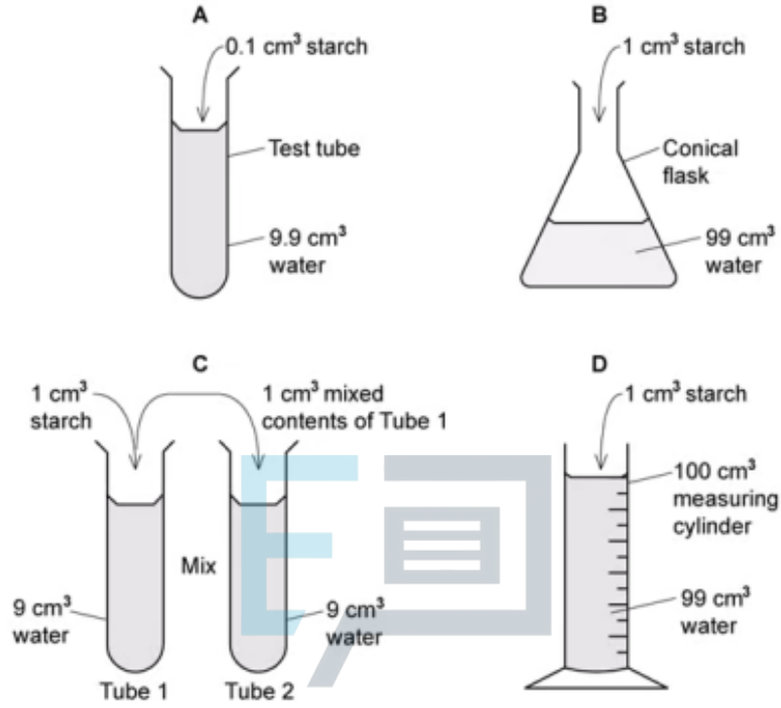
D The temperature of the solution as it exits the column.

[1 mark]

Question 10

A student wished to use a starch solution of 0.01% for an enzyme experiment. A stock solution of 1.0% starch solution was provided.

Which of the following dilutions would be the best method to achieve the desired concentration with greatest precision, using standard laboratory equipment?



[1 mark]