

## 3.2 Factors that Affect Enzyme Action

### Question Paper

Course	CIEA Level Biology
Section	3. Enzymes
Topic	3.2 Factors that Affect Enzyme Action
Difficulty	Easy

**Time allowed:** 20  
**Score:** /10  
**Percentage:** /100

### Question 1

Which statements would be true regarding the action of all enzyme inhibitors?

- 1 bind to the active site of an enzyme
- 2 cause a change in the tertiary structure of an enzyme
- 3 reduce the rate of an enzyme catalysed reaction

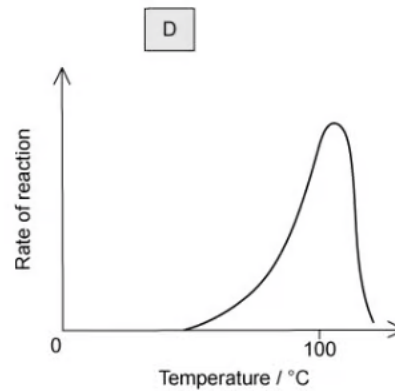
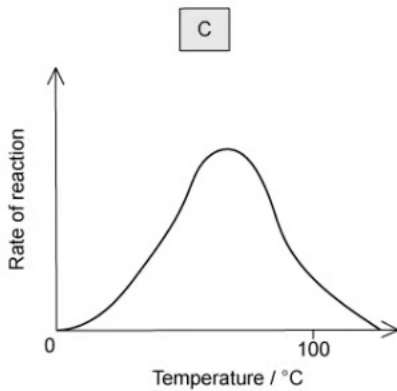
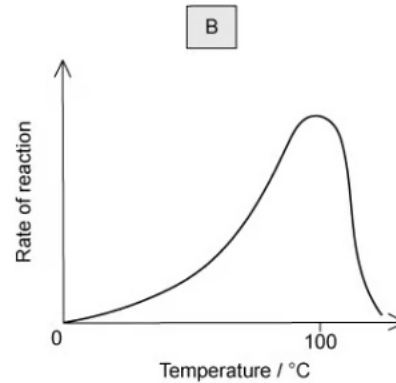
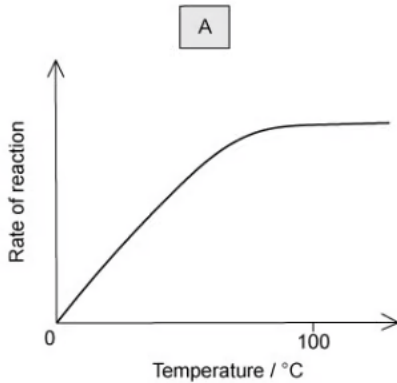
- A. 1, 2 and 3  
B. 1 and 2 only  
C. 2 and 3 only  
D. 3 only

[1 mark]

## Question 2

Hyperthermophiles grow optimally at temperatures between 80 and 110°C and comprise of species from both the bacterial and archaeal domains. These organisms have been isolated from all types of terrestrial and marine hot environments, including natural and man-made environments.

Which graph would represent the relationship between temperature and the rate of enzyme activity in hyperthermophiles?



[1 mark]

## Question 3

How does increasing substrate concentration affect the rate of an enzyme-catalysed reaction in the presence of a competitive inhibitor?

- A. The rate of the reaction slows.
- B. The rate of the reaction increases.
- C. The rate of the reaction slows initially and then recovers.
- D. The rate of the reaction is not affected by additional substrate.

[1 mark]

#### Question 4

Inhibitors of enzyme reactions form enzyme / inhibitor complexes.

Which statements about enzyme inhibition are correct?

- 1 The initial rate of reaction is decreased.
- 2 The active site changes shape while forming the enzyme/inhibitor complex.
- 3 The inhibition can be competitive or non-competitive.
- 4 The maximum rate of reaction ( $V_{\max}$ ) is increased.

- A. 1 and 3 only  
B. 2 and 3 only  
C. 1, 2 and 3 only  
D. 2, 3 and 4 only

[1 mark]

#### Question 5

Pepsin is a digestive enzyme present in the stomach of humans. The stomach environment has a pH of 2.5. Pepsin is most active in acidic environments between pH 1.5 to 2.5. The optimum temperature of pepsin is between 37°C and 42°C.

Which of the following statements is not true?

- A. Raising the pH of the stomach will decrease pepsin activity.
- B. Above 42°C the bonds in pepsin begin to break.
- C. Above pH 2.5 the tertiary structure of pepsin is changed.
- D. Temperatures below 37°C result in more enzyme/substrate complex being formed.

[1 mark]

**Question 6**

Which properties are characteristic of a competitive inhibitor of an enzyme?

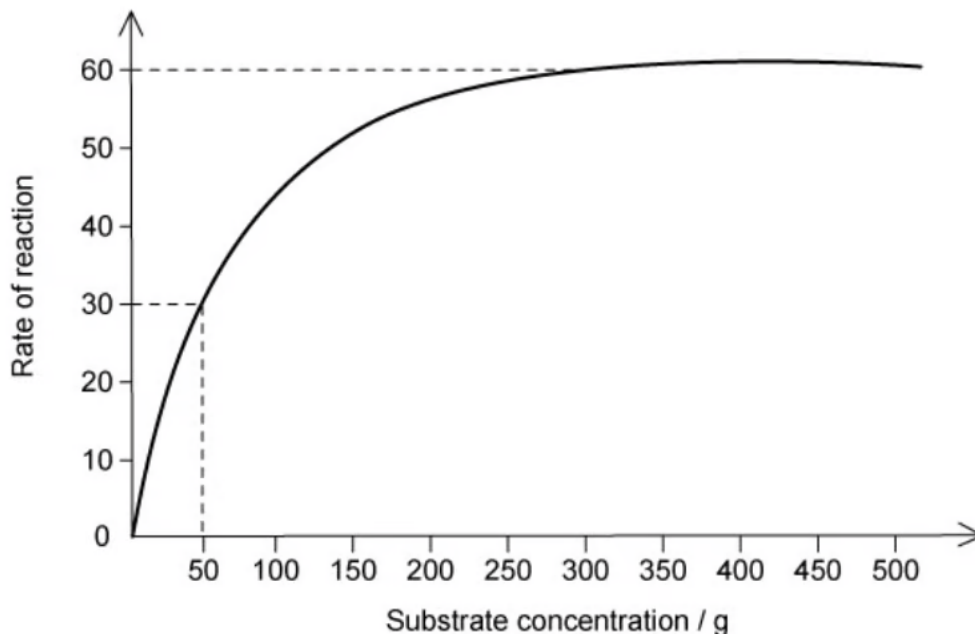
	<b>binds</b>	<b>effect of adding more substrate</b>
<b>A</b>	at active site	reduces inhibition
<b>B</b>	at active site	does not reduce inhibition
<b>C</b>	at allosteric site	reduces inhibition
<b>D</b>	at allosteric site	does not reduce inhibition

A.

[1 mark]

**Question 7**

The  $V_{\max}$  is the rate of reaction when the enzyme is saturated with substrate. This graph shows the effect of increasing substrate on enzyme activity.



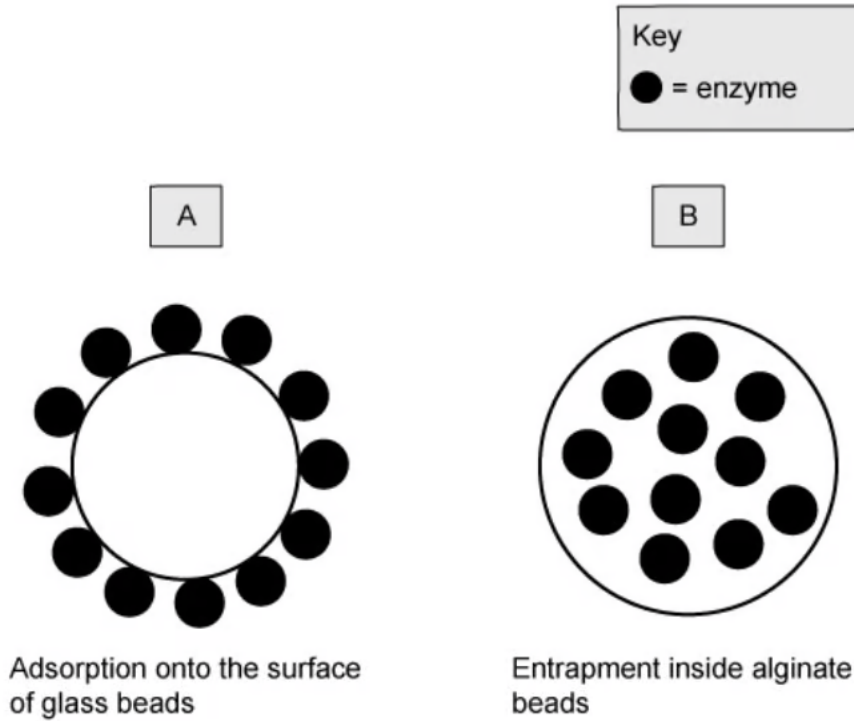
What mass of substrate is equal to the  $\frac{1}{2} V_{\max}$ ?

- A. 50g
- B. 150g
- C. 250g
- D. 350g

[1 mark]

**Question 8**

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



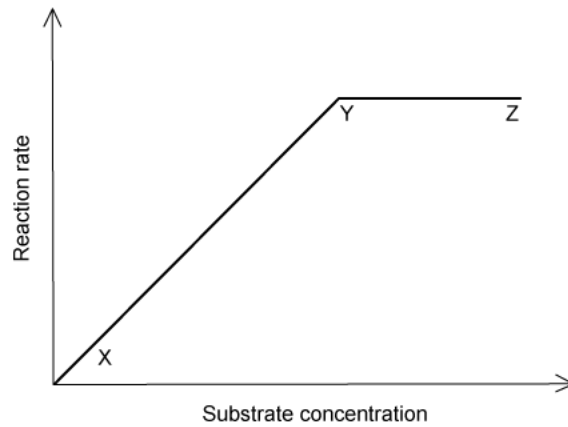
Immobilised lactase enzymes can be used to make milk digestible for lactose intolerant people. Which of the following statements about the milk produced by the use of immobilised lactase enzymes is not correct?

- A. The milk would contain glucose and galactose monosaccharides
- B. The milk would taste sweeter and be easier to digest
- C. The milk would contain lactase enzymes
- D. The milk would look the same as regular milk

[1 mark]

**Question 9**

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



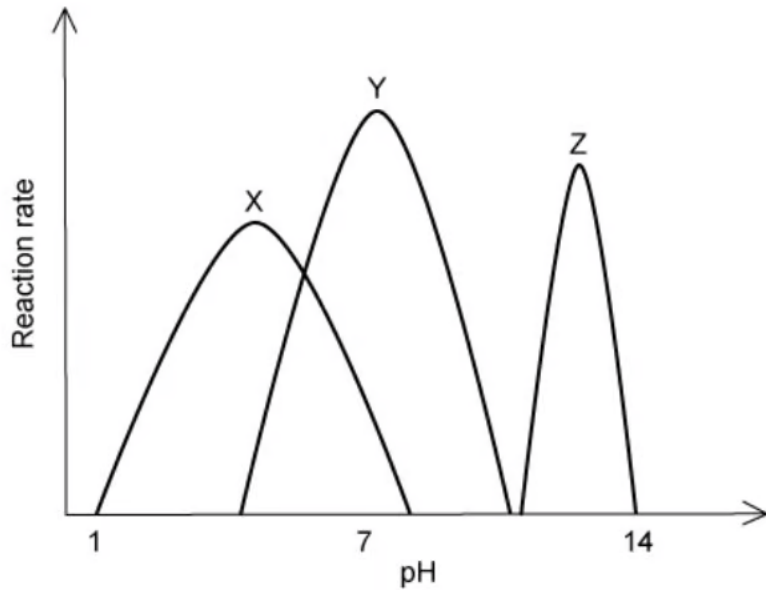
Which statement about the graph is correct?

- A. Between **X** and **Z** the temperature is limiting
- B. Between **X** and **Z**, the number of enzyme molecules is limiting
- C. Between **X** and **Y**, the number of substrate molecules is limiting
- D. Between **Y** and **Z**, the number of substrate molecules is limiting

[1 mark]

**Question 10**

The graph below shows the effect of pH on the rate on three different enzyme-controlled reactions. The enzyme concentration is constant.



Which statement about the graph is not true?

- A. At its optimum pH, enzyme **Y** has the fastest rate.
- B. There is no pH at which both **Y** and **Z** have a functional active site.
- C. There is no pH at which both **X** and **Z** have a functional active site.
- D. There is no pH at which both **X** and **Y** have a functional active site.

[1 mark]