

## Enzymes

1. A student investigated the effect of pH on the rate at which an enzyme breaks down a substrate.

What would be a suitable control for this investigation?

An identical tube set up with:

- A. no buffer
- B. no buffer and no enzyme
- C. no enzyme
- D. no substrate

Your answer

[1]

2. Which of the following, **A** to **D**, is an **incorrect** statement about enzymes?

- A. amylase and trypsin catalyse extracellular reactions
- B. catalase catalyses intracellular reactions
- C. extracellular enzymes are produced outside the cell
- D. intracellular enzymes work inside the cell

Your answer

[1]

3. Many enzymes require cofactors, prosthetic groups and coenzymes to function.

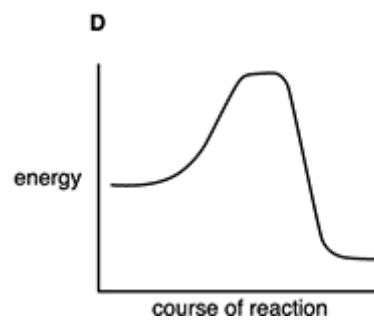
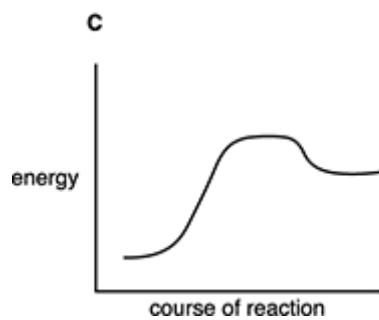
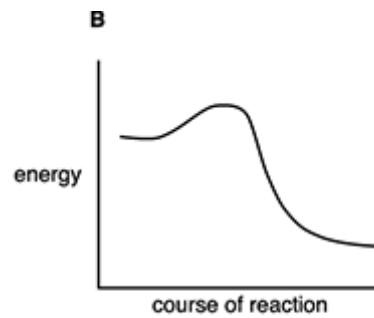
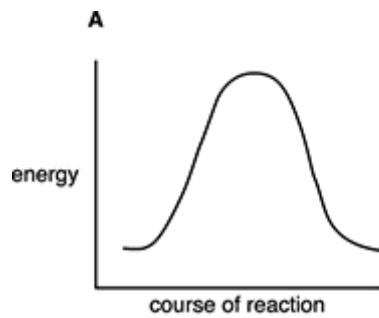
Which of the statements, **A** to **D**, is correct?

- A**  $\text{Cl}^-$  acts as a coenzyme for amylase
- B**  $\text{Cl}^-$  acts as a cofactor for carbonic anhydrase
- C**  $\text{Zn}^{2+}$  acts as a prosthetic group for amylase
- D**  $\text{Zn}^{2+}$  acts as a prosthetic group for carbonic anhydrase

Your answer

[1]

4. Which of the graphs, **A** to **D**, represents the energy changes involved during an enzyme-controlled anabolic reaction?



Your answer

[1]

5. The following statements are about enzyme action.

1. Enzymes can affect the function of organelles.
2. Enzymes can affect the structure of an organism.
3. Enzymes only work inside cells.

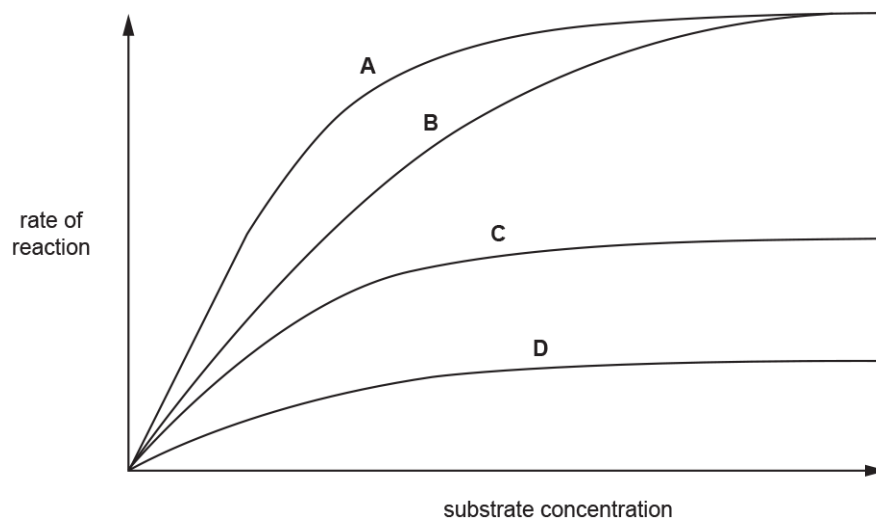
Which of the statement(s) is/are correct?

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

Your answer

[1]

6. The following graph shows the rate of reaction of an enzyme in different substrate concentrations.

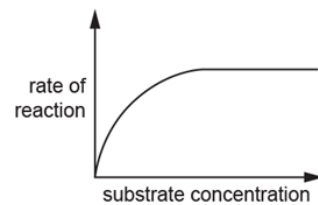


Which letter, **A** to **D**, shows the rate of reaction with a fixed quantity of competitive inhibitor?

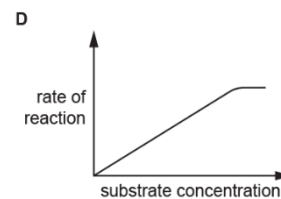
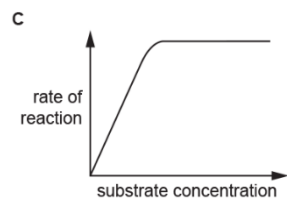
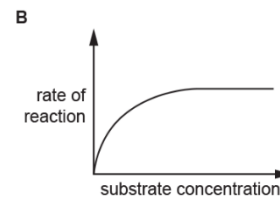
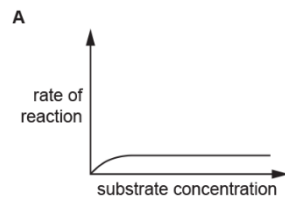
Your answer

[1]

7. The diagram below shows the effect of changing substrate concentration on the rate of an enzyme controlled reaction.



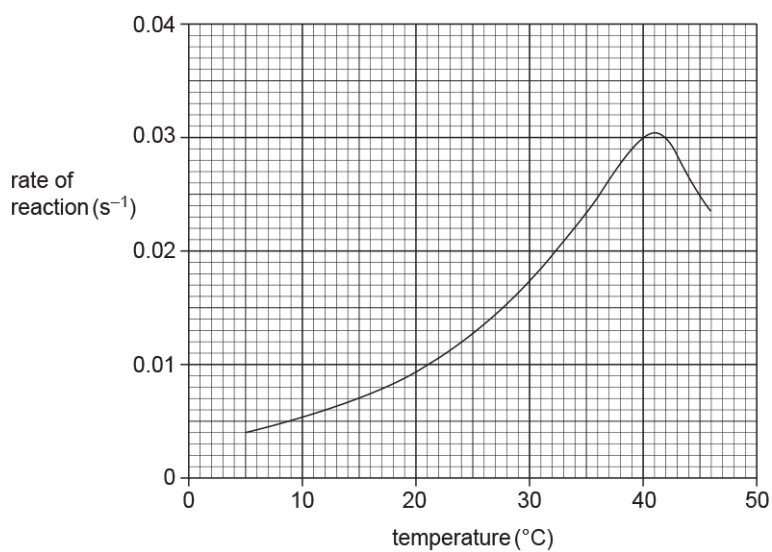
Which of the following graphs, **A** to **D**, shows how a **non-competitive** inhibitor would affect the rate of this reaction?



Your answer

[1]

8. The graph below shows how the rate of reaction of the enzyme pepsin changes with temperature.



What is the temperature coefficient,  $Q_{10}$ , of this reaction before the enzyme denatures?

- A 0.06
- B 0.35
- C 1.80
- D 3.98

Your answer

[1]

9. Which of the following, **A** to **D**, is true of a competitive enzyme inhibitor?

- A binds to a site other than the active site
- B can bind irreversibly to the active site
- C changes the shape of the active site
- D effects can be overcome by adding more substrate

Your answer

[1]

10. A scientist was investigating the effect of two different temperatures on the rate of enzyme controlled decomposition of ammonia, in soil bacteria.

They repeated their experiment ten times for each of the two different temperatures.

Which of the following, **A** to **D**, should they use to determine if there was a significant difference between these two sets of times?

- A standard deviation
- B Student' t-test
- C chi squared test
- D Spearman's rank correlation coefficient

Your answer

[1]

11. What is the correct definition of the term **coenzyme**?

- A An inorganic ion that forms the centre of a globular protein.
- B A molecule that binds to the enzyme, changing the shape of the active site, preventing an enzyme substrate complex from forming.
- C A non-protein organic molecule, not permanently attached to an enzyme, but needed to allow the enzyme to function.
- D A metal ion that attaches to the enzyme, changing the shape of the active site, increasing the likelihood of a reaction.

Your answer

[1]

12. A group of students was given a 1% solution of an unknown digestive enzyme.

They were also given three tubes containing an identical mixture of foods.

The students carried out a different biochemical test on each tube before and after adding the unknown enzyme. Their results are shown in the table below.

	Colour before	Colour after
<b>Biuret test</b>	purple	purple
<b>Iodine test</b>	blue / black	yellow / orange
<b>Benedict's test</b>	brick red	brick red

Name the type of enzyme the students used.

- A protease
- B carbohydrase
- C lipase
- D lipase

Your answer

[1]

13. A chemical produced by a metabolic pathway binds to the initial enzyme in the pathway. The chemical binds to the enzyme at a site away from the active site and inhibits the enzyme action.

Which of the following statements about the mode of action of the chemical is / are correct?

- Statement 1:** It is an end product inhibitor.
- Statement 2:** It is a competitive inhibitor.
- Statement 3:** It binds to the allosteric site of the enzyme.

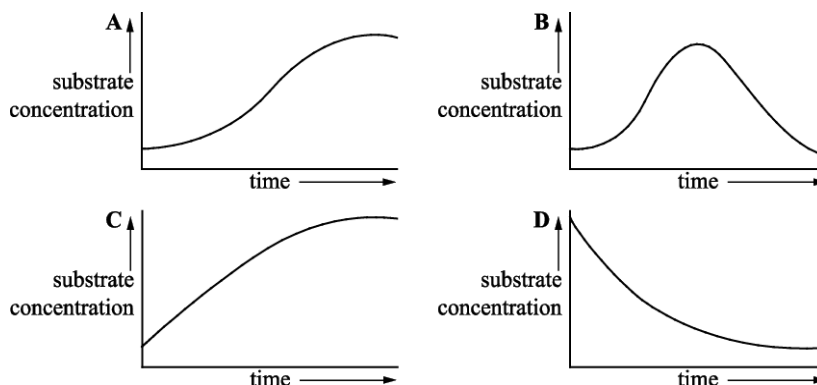
- A. 1, 2 and 3
- B. Only 1 and 2
- C. Only 1 and 3
- D. Only 1

Your answer

[1]

14. A group of students monitored the **substrate** concentration during an enzyme-controlled reaction.

Select the graph that correctly shows how the substrate concentration changes during the course of the reaction.



Your answer

[1]

15. Zinc ions are necessary for the enzyme carbonic anhydrase to work.

Which statement correctly describes the nature and function of zinc ions in their interaction with carbonic anhydrase?

- A. inorganic ions and coenzymes
- B. vitamins and prosthetic groups
- C. inorganic ions and prosthetic groups
- D. vitamins and coenzymes

Your answer

[1]

16. Enzymes are capable of affecting the metabolism and structure of whole organisms. Which of the following enzymes will have the greatest effect on the **development** of an organism as a whole?

- A Methyltransferase: adds methyl groups to DNA allowing genes to be switched on or off.
- B Reverse transcriptase: generates complementary DNA from an RNA template.
- C Deoxyribonuclease: digests free DNA molecules outside of the nucleus.
- D Telomerase: lengthens ends of chromosomes by adding DNA sequences, preventing them from being degraded.

Your answer

[1]

17. Which of the following factors does **not** affect the shape of the active site of an enzyme?

- A a drop in temperature
- B non-competitive inhibitor
- C a change in pH
- D binding of substrate

Your answer

[1]

18. Fig. 2.1 shows the shapes of an enzyme molecule, its substrate and the molecules of three substances, P, Q and R.

Each substance could bind either to the enzyme or to the substrate to cause an effect.

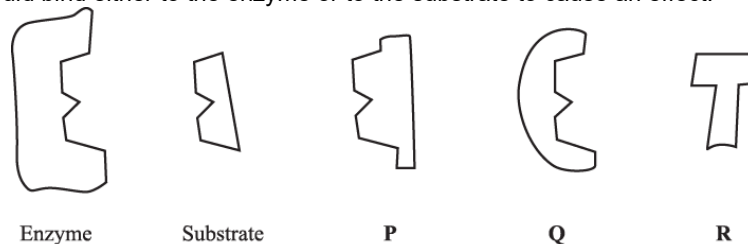


Fig. 2.1

Four tubes were set up:

- The control contained enzyme and substrate only
- **Tube P** contained enzyme, substrate and substance P
- **Tube Q** contained enzyme, substrate and substance Q
- **Tube R** contained enzyme, substrate and substance R.

Which option describes the most likely effect on the rate of reaction in each tube **compared** with the control?

	Tube P	Tube Q	Tube R
A	increased	no effect	no effect
B	decreased	no effect	decreased
C	decreased	no effect	no effect
D	decreased	decreased	no effect

Your answer

[1]

19. Which inorganic ion can act as a cofactor for amylase?

- A  $\text{OH}^-$
- B  $\text{PO}_4^{3-}$
- C  $\text{Cl}^-$
- D  $\text{HCO}_3^-$

Your answer

[1]