**Proteins and Enzymes – Homework**

A reaction takes place because the active site of an enzyme is complementary to

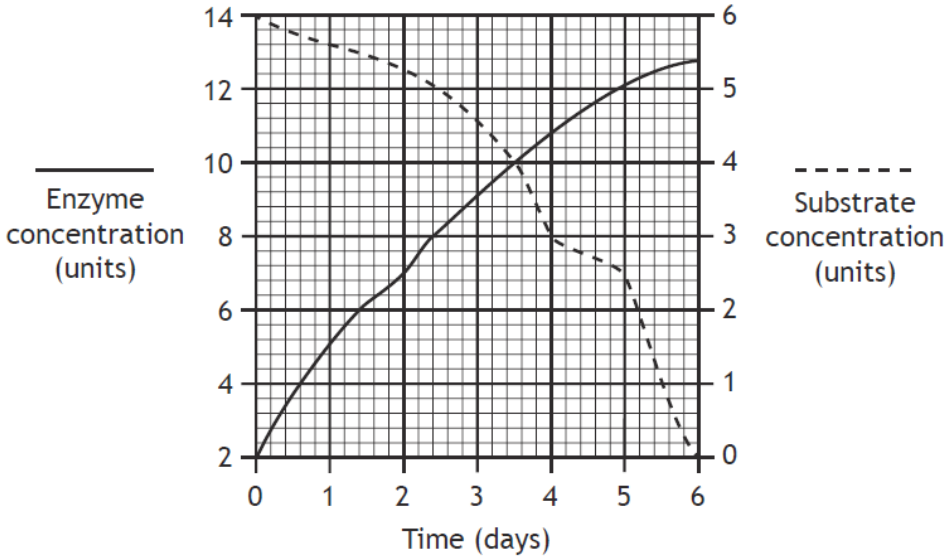
A one type of substrate molecule

B all types of substrate molecule

C one type of product molecule

D all types of product molecules.

The graph below shows changes in the enzyme and substrate concentrations in a seed over a period of time.




How many days does it take for the substrate concentration to decrease by 50%?

A 2

B 3

C 4

D 5

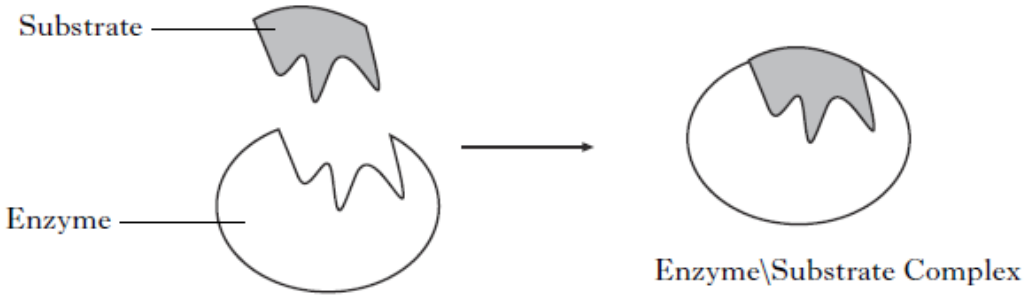
Which line in the table below correctly shows the functions of an enzyme?

| | *Energy input of the chemical reaction* | *Rate of the chemical reaction* |
|---|---|---|
| A | lowers | speeds up |
| B | raises | slows down |
| C | raises | speeds up |
| D | lowers | slows down |

**Proteins and Enzymes – Homework**

*Marks*

Enzymes are biological catalysts. The diagram below shows part of an enzyme controlled reaction.




(*a*) Describe the features of an enzyme which allow it to combine with only one substrate.

_____

_____

_____ **2**

(*b*) What happens to an enzyme when it is boiled?

_____ **1**

(*c*) Name a factor, other than temperature, which affects enzyme activity.

_____ **1**

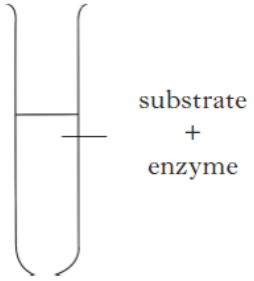
(*d*) Complete the following word equation for the enzyme catalase.

hydrogen peroxide $\xrightarrow{\text{catalase}}$ _____ and _____ **1**

**substrate** **products**

An investigation was carried out to find the effect of pH on the activity of an enzyme.

Substrate at different pH values was added to the enzyme in different test tubes.

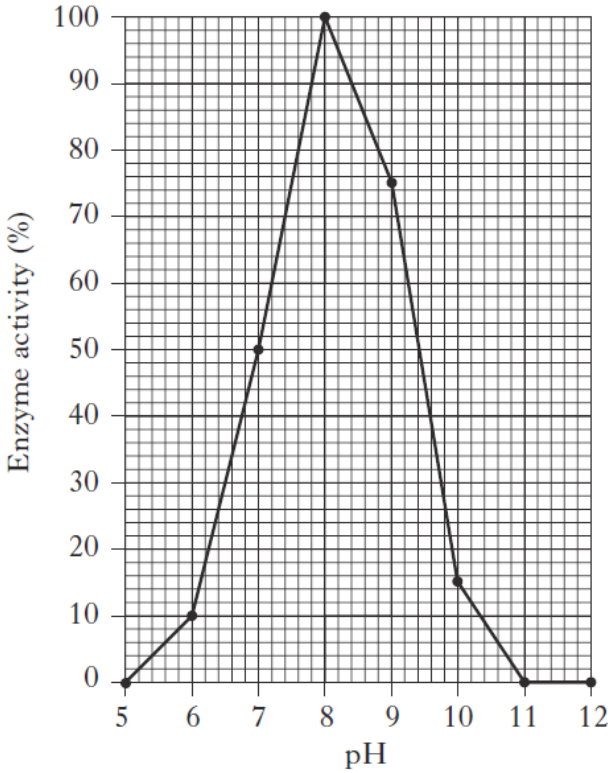



(*a*) State **two** variables that must be kept constant for a valid conclusion to be made from this investigation.

1 _____

2 _____ **2**

(*b*) The results of this investigation are shown in the graph below.




(i) What is the optimum pH for this enzyme?

_____ **1**

(ii) How many times more active is the enzyme at pH 9 than at pH 10?

*Space for calculation*

MARK

(a) Hydrogen peroxide can damage cells and lead to cell death. Catalase is an enzyme which breaks down hydrogen peroxide into oxygen and water.

Scientists in New Zealand investigated the link between the level of catalase in sheep livers and the fat in their meat. The hypothesis was that the higher the level of liver catalase, the greater the fat content of the meat.

In the investigation, they examined 9 sheep with a high percentage of fat and 15 sheep with a low percentage of fat. The sheep with the high percentage of fat had an average catalase level of 4800 K/g and those with the lower percentage of fat had an average catalase level of 3600 K/g.

The scientists concluded that their hypothesis was correct.

(i) Name the substrate of catalase. **1**

_____

(ii) Identify an aspect in the planning of the investigation that would suggest that the hypothesis might not be proven correct. **1**

_____

_____

(iii) A further investigation proved that the hypothesis was correct.

Describe how this investigation could help farmers to select only sheep with a low percentage of fat, to provide meat for consumers following a low fat diet. **1**

_____

_____

(b) The optimum temperature for the activity of catalase is 37°C.

Predict what would happen to the activity of catalase if the temperature was lowered to 34°C. **1**

_____

**Total marks 4**