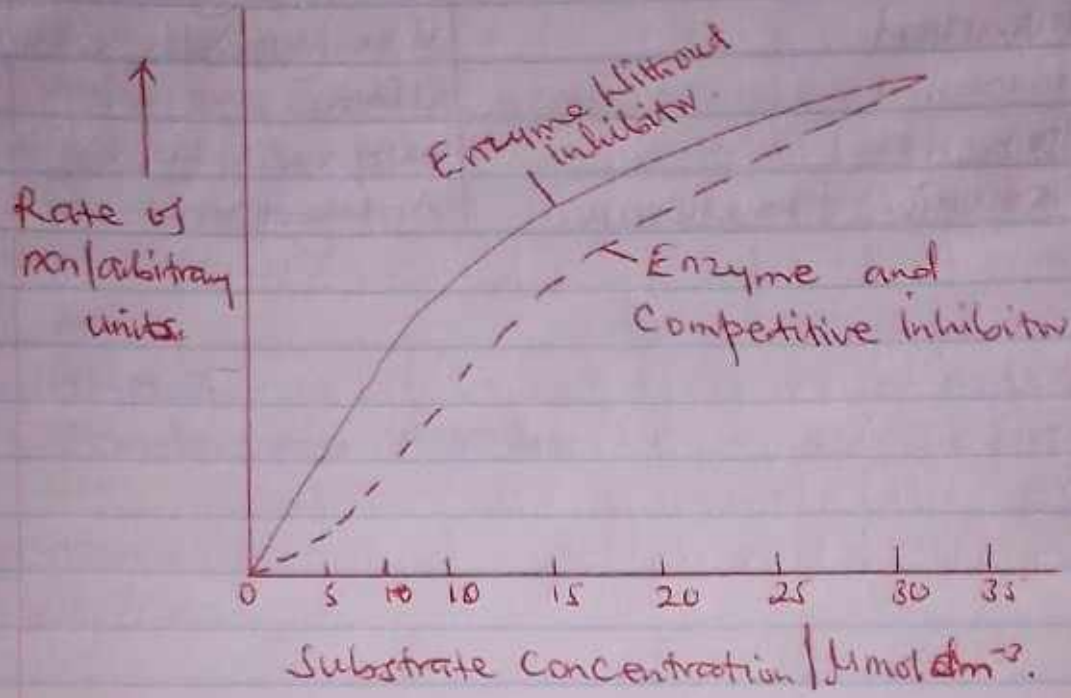
ENZYMES.

The graph shows the results of an investigation into the effect of a competitive inhibitor on an enzyme-controlled reaction over a range of substrate concentrations.

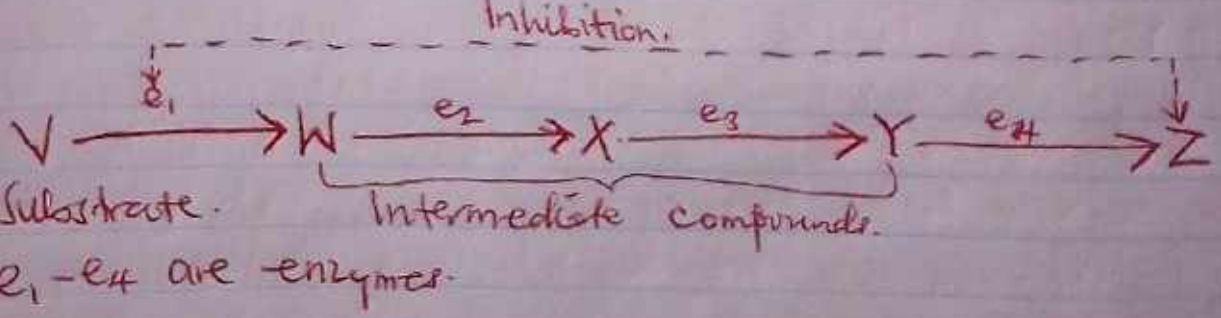


(a). Give one factor which would need to be kept constant in this investigation. (1mk).

(b)(i). Explain the difference in the rates of rxn at the substrate concentration of 10 μmol cm^{-3} (2mks).

(ii). Explain why the rates of reaction are similar at the substrate concentrations of 30 μmol cm^{-3}. (1mk).

(c). The diagram below represents a metabolic pathway controlled by enzymes.

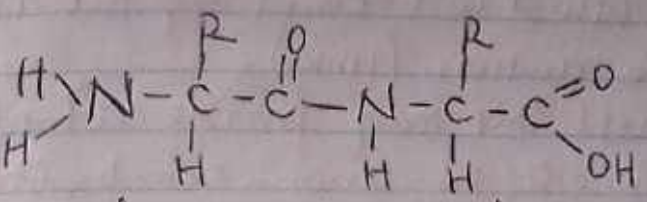


e_1 - e_4 are enzymes.

(i). Name the type of control mechanism which regulates production of Compound Z. (1mk).

(ii). Explain precisely how an excess of Compound Z will inhibit its further production. (2mks).

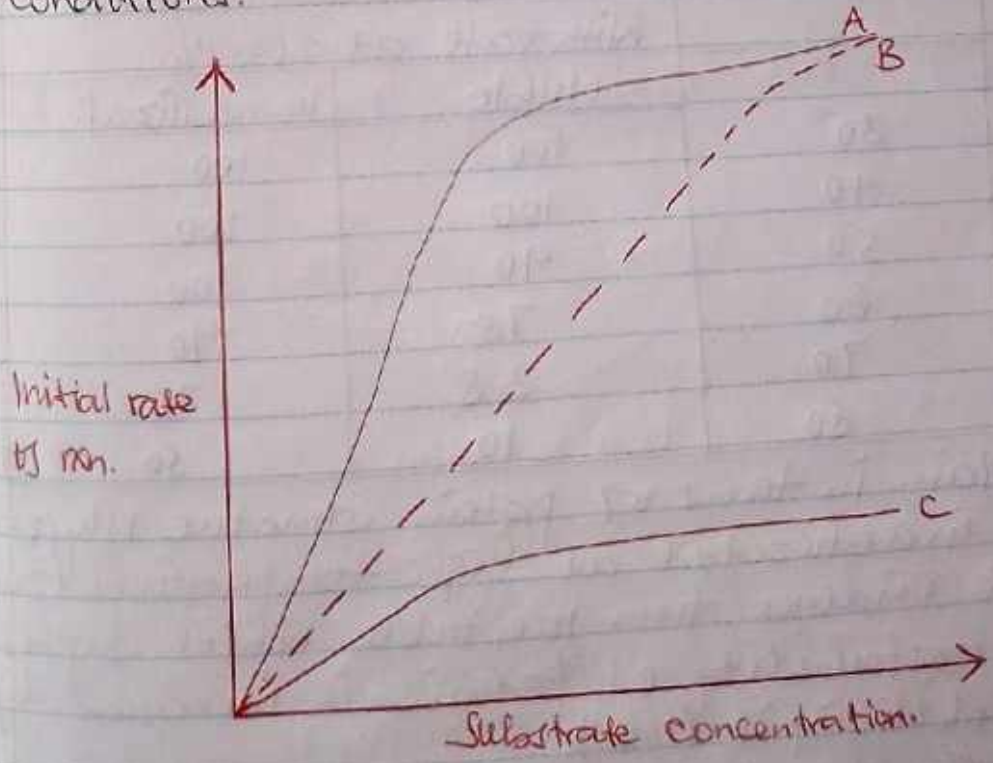
20. The diagram shows the structure of a dipeptide.



(i). With the aid of a similar diagram, show the reaction which breaks the dipeptide into its amino acids. (2mks).

(ii). What type of enzyme catalyses the reaction you have shown? (1mk).

The graph shows the relationship between substrate-concentration and the initial rate of an enzyme-catalysed reaction under different conditions.



A - no inhibitor
B - Competitive inhibitor
C - non-competitive inhibitor.

(b). Suggest why the initial rate of the reaction was measured in each case (2mks).

(c). Explain.

(i). the shape of curve A. (2mks).

(ii). the difference btn the shapes of curves B and C (2mks).

(d). Explain what is meant by the induced fit model of enzyme action. (1mk).

(ii) Suggest how this may provide a better explanation for the effects of anon-competitive inhibitor than the lock and key model (1mk).

The thermostability of enzymes is important in industrial use. one such enzyme is papain. The table compares the thermostability of the enzyme papain in soluble and in immobilized forms.

Temperature(°c)	Rate of reaction compared with rate at 25°c(%).	
	Soluble	Immobilized.
30	100	100
40	100	100
50	90	100
60	78	90
70	38	78
80	10	50

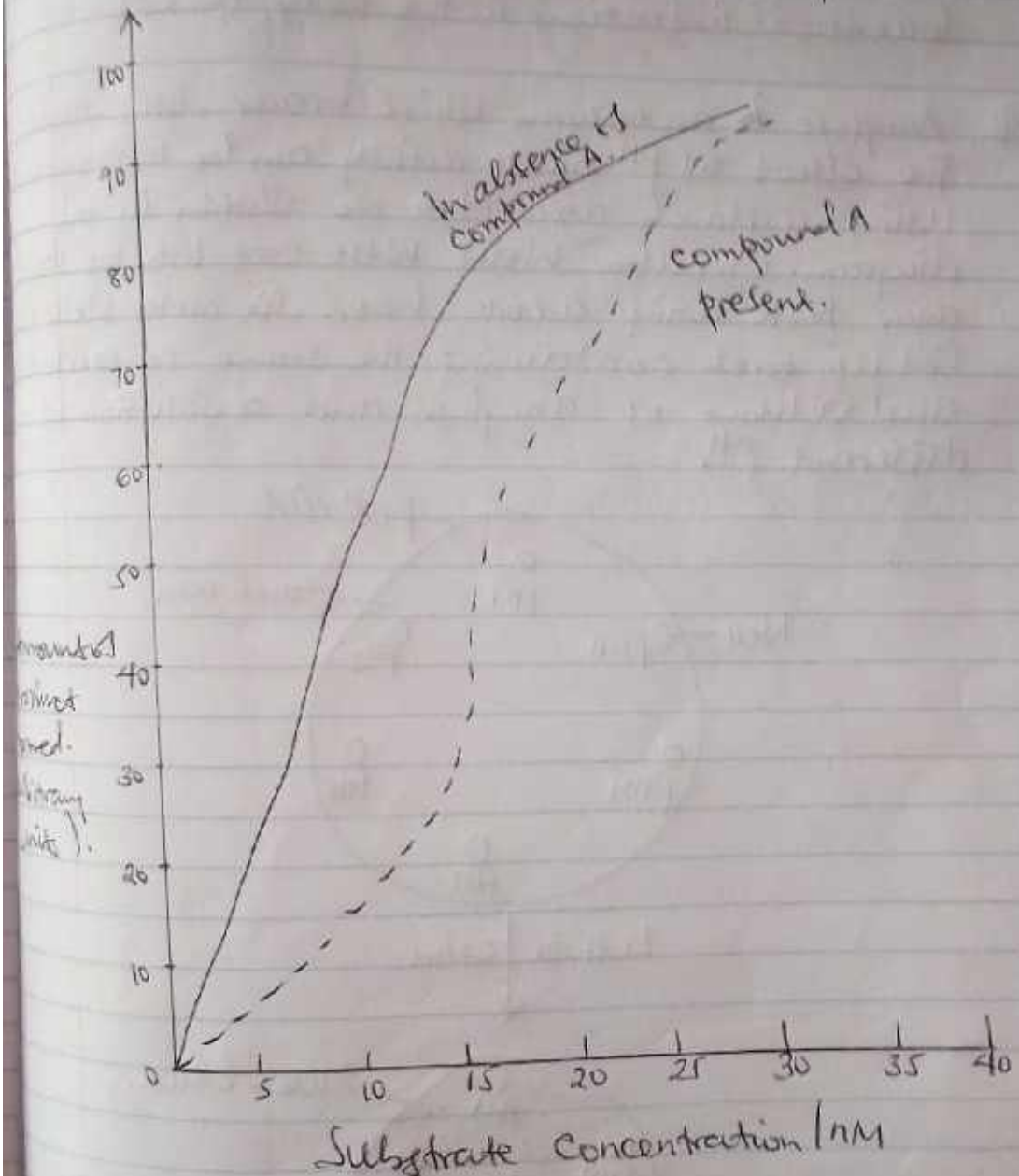
(e). Explain in terms of protein structue why enzymes are inactivated at high temperatures (3mks).

(f). Give evidence from the table which suggests that thermostability of papain is increased by immobilizing it (1mk).

9). Briefly describe one method that might have been used to immobilise the enzyme. (1mk).

(b). Briefly discribe amethod that you might use in the laboratory to measure the thermostability of a named enzyme (4mks).

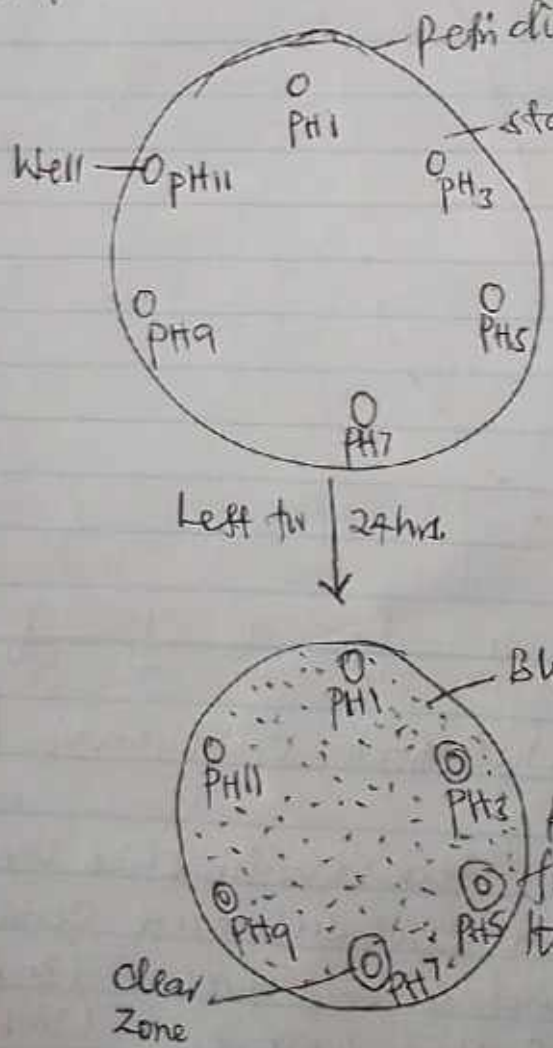
3. The effect of different concentrations of substrate on the rate of an enzyme-catalysed reaction was investigated. The experiment was then repeated using the same experimental conditions and substrate concentrations but in the presence of a fixed amount of compound A (0.2nM). The results are shown in the following graph.



(i) Comment on the relationship between the reaction rate and substrate concentration when
(ii) No compound A was present (3mks).
(iii) Compound A was present (3mks).

(b). How may the experimental results be explained
(i). In absence of compound A, (4mks).
(ii). When compound A is present? (3mks).
(c). What might be the effect of using 0.4mM of compound A in the experiment? (2mks).
(d). Suggest why compounds with similar properties to compound A are often used to combat bacterial infections in the body. (3mks).

(A). Amylase is an enzyme which breaks down starch. The effect of pH on its activity can be investigated by using a starch agar plate as shown in the diagram. Circular wells were cut into the starch agar plate using a cork borer. Six outer wells were set up, each containing the same concentration and volume of amylase and a solution of different pH.



(a). Explain how you could use these results to compare the activity of the enzyme at different pH values. (1mk).

(b). Explain the result obtained at pH 7. (1mk).

(c). Using your knowledge of enzyme structure, explain the result obtained at pH 11. (2mks).

(d). Describe the control that would be necessary in this investigation. (2mks).