

Enzymes

Question Paper 8

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Enzymes
Sub Topic	Enzymes
Booklet	Theory
Paper Type	Question Paper 8

Time Allowed : 70 minutes

Score : / 58

Percentage : /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 (a) Fig. 1.1 shows the breakdown of a molecule of sucrose.

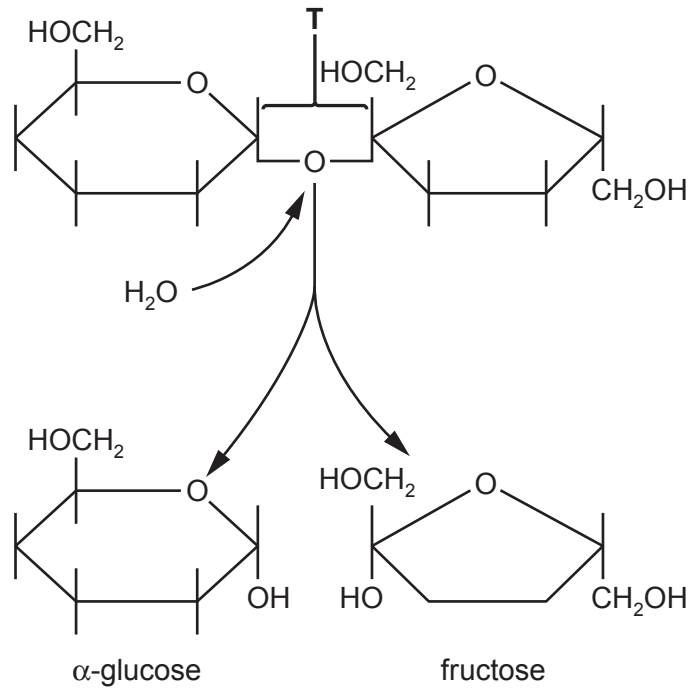


Fig. 1.1

(i) Name the bond indicated by T.
 [1]

(ii) State the name given to this type of reaction in which water is involved.
 [1]

(iii) State two roles of water **within plant cells** other than taking part in breakdown reactions.

1. [2]

2. [2]

(b) Enzymes are globular proteins.

State what is meant by the term *globular*.

.....

 [2]

- (c) The reaction shown in Fig. 1.1 is catalysed by the enzyme sucrase. Fig. 1.2 shows an enzyme-catalysed reaction.

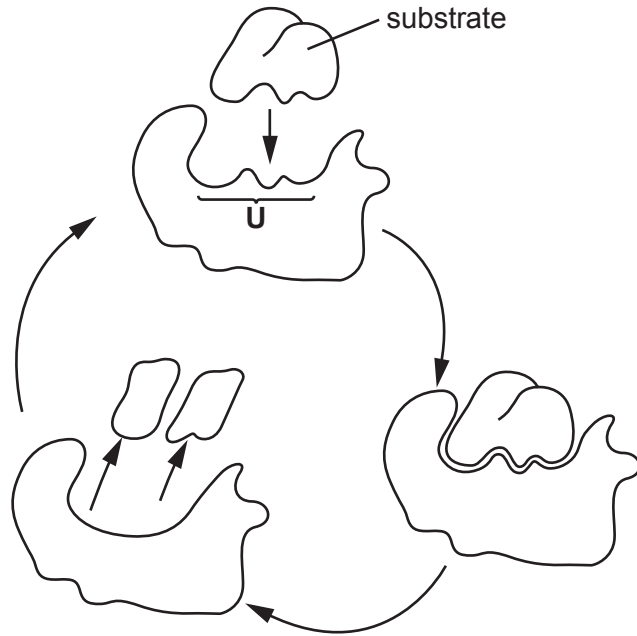


Fig. 1.2

- (i) Name the part of the enzyme labelled **U**.

..... [1]

- (ii) With reference to Fig. 1.2, explain the mode of action of enzymes.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
..... [4]

[Total: 11]

2 Catalase is an enzyme with a molecular structure composed of four identical sub-units.

Fig. 4.1 is a diagram that shows how catalase is produced in cells.

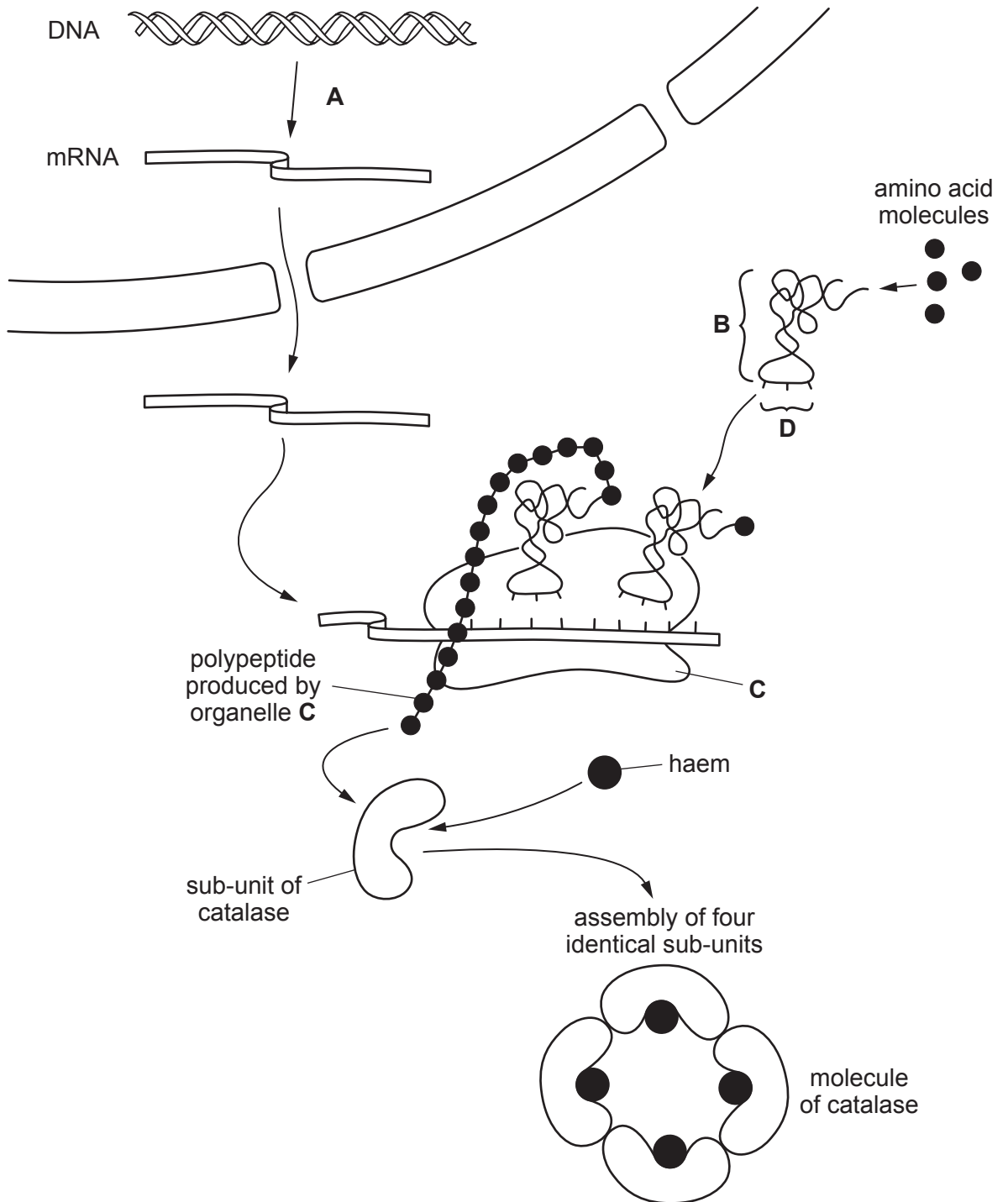


Fig. 4.1

(a) With reference to Fig. 4.1,

(i) name

process **A**

molecule **B**

structure **C**

sequence of bases **D** [4]

(ii) state two ways in which the structure of catalase is similar to the structure of haemoglobin and one way in which it differs

structural similarities

1.

2. [2]

structural difference

..... [1]

(iii) State why it is possible for a catalase molecule to bind to four substrate molecules at the same time.

..... [1]

(b) The enzyme amylase catalyses the following reaction:



The progress of this reaction may be followed by measuring either the starch concentration or the maltose concentration at intervals of time.

State which chemicals you would use to detect the disappearance of the substrate and the appearance of the product, in order to follow the progress of the reaction.

disappearance of substrate

.....

appearance of product

..... [2]

[Total: 10]

- 3 An estimated 300 to 500 million cases of malaria occur worldwide each year resulting in 1 to 3 million deaths. 80% of these cases are in children under the age of five.

There are four species of malarial parasite, of which *Plasmodium falciparum* is responsible for most of the deaths from this disease.

- (a) Describe how the malarial parasite is transmitted.

.....
.....
.....
.....
.....
..... [3]

- (b) Several potential vaccines against malaria have been developed. Some of these make use of proteins from the surface membrane of *P. falciparum*.

- (i) Explain how using such a vaccine may give long-term immunity to malaria.

.....
.....
.....
.....
.....
.....
..... [4]

- (ii) Researchers have been trying to develop a successful vaccine against malaria for about 20 years. Explain why it has proved so difficult to develop such a vaccine.

.....
.....
..... [2]

- (c) Proteins on the surface of the parasite are responsible for binding to surface receptors on the red blood cells. These are removed when the parasites enter the red blood cells.

An enzyme has recently been discovered in *P. falciparum* that is responsible for the removal of these proteins. If the enzyme does not function then the parasites cannot enter red blood cells.

It has been suggested that a drug could be developed to inhibit this enzyme.

Describe **one** possible way in which such a drug might act on the enzyme to prevent it from functioning.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 12]

4 Fig. 6.1 is a photomicrograph of phloem sieve tubes from a plant stem.

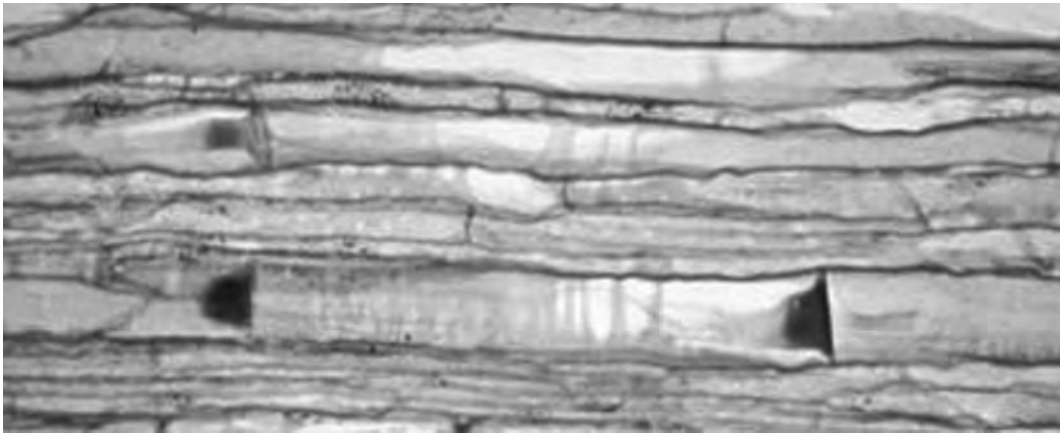


Fig. 6.1

(a) State two features, **visible in Fig. 6.1**, which distinguish sieve tubes from xylem vessels.

- 1.
- 2.

[2]

(b) Explain briefly how sucrose is **moved**, or translocated, **through** sieve tubes.

.....
.....
.....
..... [2]

(c) Some enzymes are found in phloem tissue.
Describe how enzymes catalyse reactions.

.....
.....
.....
.....
.....
.....
..... [3]

[Total: 7]

- 5 The passage below summarises the effects of gibberellins on seed germination.

Complete the passage by using the most appropriate scientific term(s).

When a seed is shed from the parent plant, it is in a state of ,
which means it is metabolically inactive.

When water is absorbed by a seed, it stimulates the production of gibberellin by the
..... within the seed. The gibberellin stimulates the synthesis of
amylase by cells in the layer.

Amylase hydrolyses starch molecules in the converting them
to soluble molecules. These molecules are converted to
glucose which is transported to the embryo, providing a source of carbohydrate that can be
respired to provide as the embryo begins to grow.

Gibberellin causes these effects by regulating genes that are involved in the synthesis of
amylase. It has been shown that application of gibberellin to seeds can cause an increase in
the of the DNA coding for amylase.

[Total: 7]

6 Antibiotics are drugs which are very important in the treatment and cure of some diseases.

(a) Underline the disease or diseases in the list below which are treatable with antibiotics.

cholera

malaria

HIV/AIDS

tuberculosis (TB)

[1]

(b) When patients are prescribed a course of antibiotics, they must not stop taking the antibiotics as soon as they start to feel better, or when they feel that the disease symptoms have gone.

Explain the importance of taking a complete course of antibiotics.

.....
.....
.....
.....
.....
.....
..... [3]

(c) Some antibiotics act as competitive inhibitors of enzymes in pathogens.

(i) Describe what is meant by the term competitive inhibitor.

.....
.....
.....
.....
.....
..... [3]

Penicillin acts as a competitive inhibitor of one of the enzymes involved in bacterial cell wall synthesis.

(ii) State why penicillin, which is an enzyme inhibitor, can be taken by humans.

.....
.....
..... [1]

(iii) Suggest the effect which penicillin will have on bacterial cells.

.....
.....
.....
.....
..... [3]

[Total: 11]