

Subject: Biology

Topic: Enzyme

Level: S.4

Background information:

In S.3, students have learnt about

- i. the chemical nature and the function of the seven food substances in Chapter 11 Food and Human
- ii. the digestive system, the saliva in the mouth and the digestion of starch to sugar

Learning objectives:

The extract is from the middle of the first lesson. Before this, students learn how to write a definition for metabolism and metabolic rate.

2. Language:

Students will

- ◆ Use language features to describe
- ◆ correctly use associated subject related terminology both in writing and oral language
- ◆ follow an advanced organiser to write a short text to show a sequence

Now, students are guided to give a definition for enzyme orally. They are also trained to use the correct sentence pattern in describing the action of enzyme. i.e. **amylase speed up the digestion of starch**. It is important because a sentence like “Amylase digests starch” implies a wrong concept that enzyme takes part in the reaction, which they will learn in the next lesson.

Also a scenario (cooking rice) is used to help students to realize the meaning of “speeding up a chemical reaction.” The story is used as a set to arise their interest.

Content obligatory vocabulary like: **enzyme, speed up chemical reaction, biological catalyst, amylase, protease and lipase** are introduced. Students are asked to pronounce the words or use the words in answering questions.

An advanced organizer is written on board which serves the purpose of:

- i. Giving introduction
- ii. Guiding the learning progress
- iii. Giving helps to students in answering questions
- iv. Giving conclusion

S.4 Biology
The mechanism of enzyme action
Worksheet 1

Name : _____ No.: _____ Class: _____ Date: _____

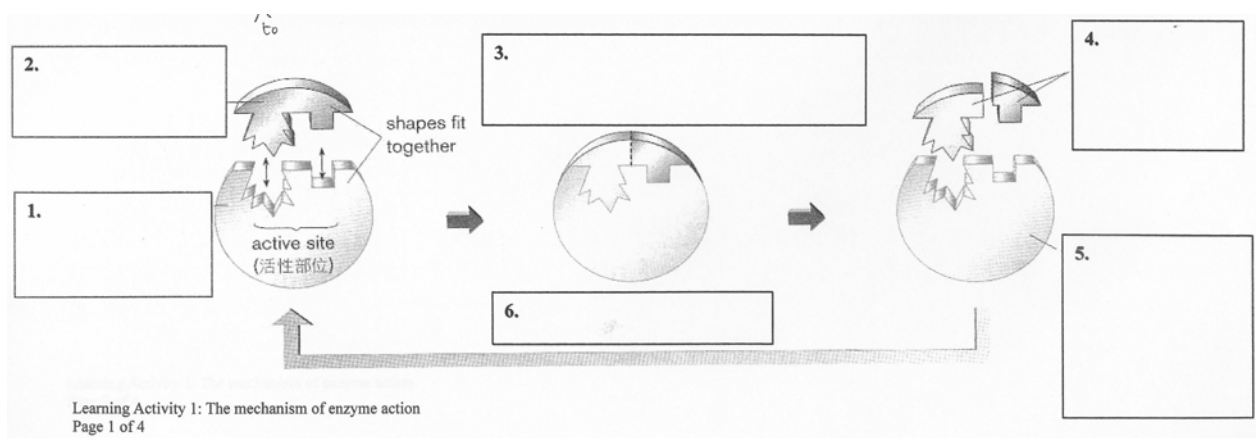
Activity 1

The sentences below describe the mechanism of enzyme action. Complete the sentences by adding the words: **active site**, **broken down**, **enzyme-substrate complex**, **product**, **reused**, **released**, **substrate**, **unstable complex**

- The enzyme and substrate combine to form a temporary structure called the _____
- Reaction begins. Substrate molecule is _____ into smaller,
- The enzyme molecule has an _____ with a specific shape.
- The enzyme remains unchanged. It is _____ and can be _____
- The _____ breaks down to give the products of the reaction.
- _____ molecule with the correct shape can fit into the active site of the enzyme

The following diagram shows the action of enzyme in **catabolic reactions** (reaction in which substrates are broken down to smaller product).

Use the sentences above to fill in the text boxes 1 to 6 that describe the mechanism of enzyme action. Note that the sentences are not in the correct order.



Activity 2

With reference to the diagram above , write a short paragraph to describe the mechanism of enzyme action. Words like first, then next and finally should be used to describe the sequence.

The enzyme molecule has an active site with a specific shape. The substrate molecule

First,

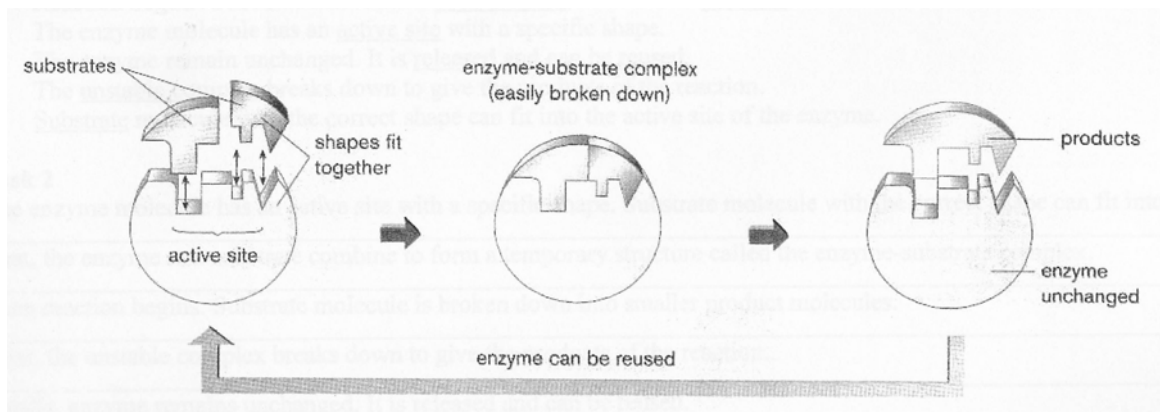
Then,

Next,

Finally,

Activity 3

Enzymes also speed up **anabolic reactions (reactions in which small substrate molecules combine to form a product)**. Study the diagram below which show the action of enzyme action in anabolic reactions. Write a paragraph to describe the mechanism of enzyme action. Words like first, then next and finally should be used to signal a sequence.



The enzyme molecule has an active site with a specific shape. The substrate molecule

First,

Then,

Next,

Finally,

Answer to worksheet 1:

Activity 1

The enzyme and substrate combine to form a temporary structure called the enzyme-substrate complex.

The reaction begins with the substrate molecule is broken down into smaller **product molecules**.

The enzyme molecule has an active site with a specific shape.

The enzyme remains unchanged. It is released and can be reused.

The unstable complex breaks down to give the products of the **reaction**.

Substrate molecules with the correct shape can fit into the active site **of the enzyme**.

Activity 2

The enzyme molecule has an active site with a specific shape. Substrate molecules with the correct shape can fit into the active site of the enzyme.

First, the enzyme and substrate combine to form a temporary structure called the Enzyme-substrate complex.

Then the reaction begins. The substrate molecule is broken down into smaller product molecules.

Next, the unstable complex breaks down to give the products of the reaction..

Finally, The enzyme remains unchanged. It is released and can be reused.

Activity 3

The enzyme molecule has an active site with a specific shape. Substrate molecules with the correct shape can fit into the active site of the enzyme.

First, the enzyme and substrates combine to form a temporary structure called the Enzyme-substrate complex.

Then the reaction begins. Substrate molecules combine together to form product molecules.

Next, the unstable complex breaks down to give the products of the reaction.

Finally, the enzyme remains unchanged. It is released and can be reused.