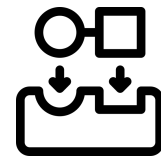


## Enzymes - How Do They Work?

Enzymes are proteins that help speed up chemical reactions in our bodies. Any chemical that speeds up reactions is called a catalyst. Enzymes are essential for many processes in our body, such as digestion. An enzyme called lactase breaks down a sugar found in milk, called lactose. Some adults do not have a lactase enzyme and cannot digest milk. People who are lactose intolerant should avoid dairy! Most

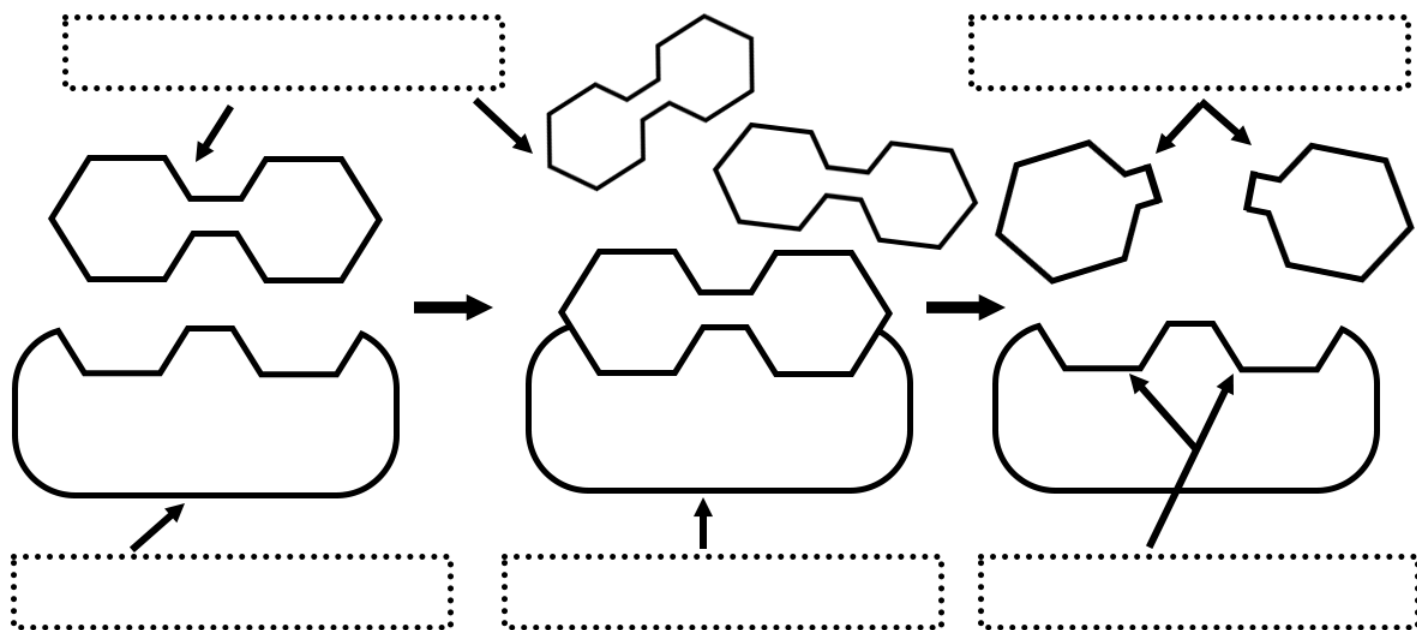


Enzymes work by binding to a substrate. Enzymes are specific to their substrates. Each has an active site that matches the substrate, fitting like a lock and a key. When the enzyme and substrate combine, it is called the enzyme-substrate complex. Once an enzyme and substrate join, the active site is blocked, so no other substrate can fit until the reaction is complete.

Once the reaction is complete, the products release from the active site. This frees the enzyme to interact with other substrates. The reactions will continue until there is no longer any substrate to interact with.

1. Color and label the diagram showing how the enzyme amylase breaks down starch into sugars.

Enzymes (Red) ☐    Substrates (Blue) ☐    Products (Green) ☐    Active Site (Highlight Pink) ☐



Circle or highlight the correct word in the sentence.

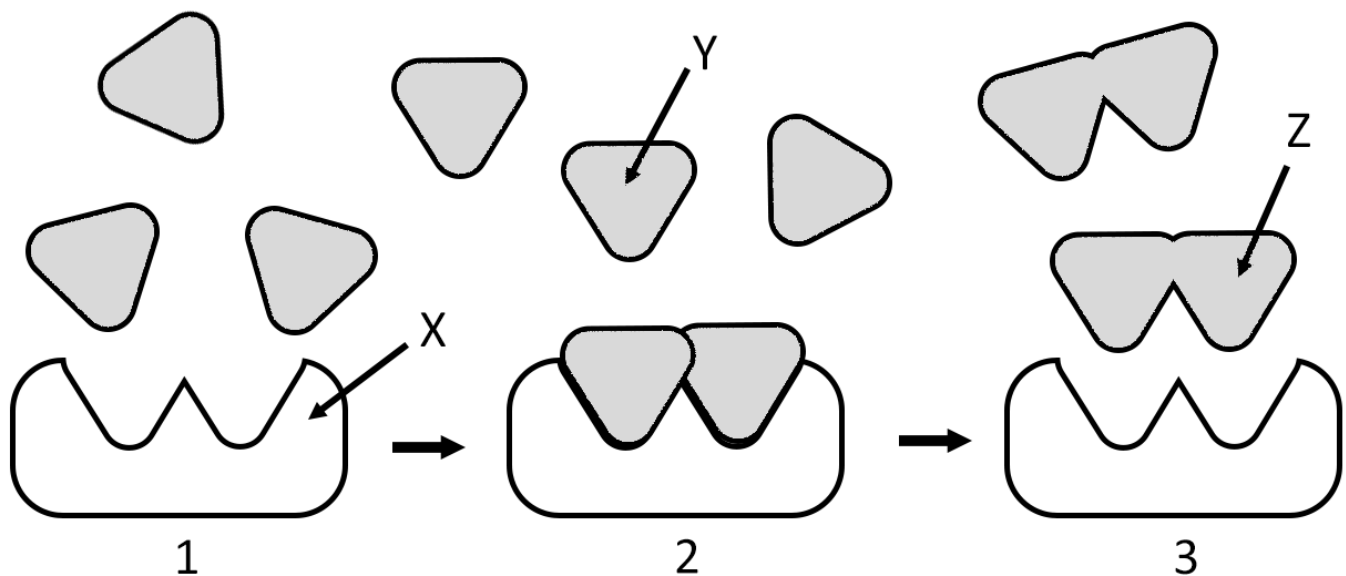
2. Enzymes bind with [ products | substrates ].
3. The enzyme that breaks down starch is called [ amylase | catalase ].
4. Enzymes [ are | are not ] reusable.
5. Enzymes [ slow down | speed up ] reactions.
6. Lactase helps to break down [ products | lactose ] into simple sugars.
7. When an enzyme joins with a substrate, it is called the enzyme-substrate [ product | complex ].
8. If you add more substrate, the reaction will [ continue | stop ].
9. If you add more enzyme, the reaction will [ continue | stop ].
10. Enzymes are essential to life processes, like [ reproduction | digestion ].

## Anabolic Enzymes

Enzymes that catalyze the breakdown of substances usually release energy, like the one that breaks down starch. Some enzymes help to build molecules, like the conversion of glucose into starch. These reactions require the input of energy, and are called anabolic reactions. For example, glucose is a simple sugar that can combine with other molecules to make long chains, like those in starch. Starch is an energy storage molecule in plants.

Examine the graphic below that illustrates the process of creating a disaccharide sugar, like sucrose (the kind of sugar you put on your cereal). Sucrose is made from a molecule of glucose and a molecule of fructose.

1. Describe what is happening at each step



1. Describe what is happening at each step.

| Step 1 | Step 2 | Step 3 |
|--------|--------|--------|
|        |        |        |

- What is X? \_\_\_\_\_
- What is Y? \_\_\_\_\_
- What is Z? \_\_\_\_\_
- What is table sugar made from? \_\_\_\_\_
- What is an anabolic reaction? \_\_\_\_\_