

Enzyme definition, Examples, Functions and Structure

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Definition of an enzyme.

An enzyme is a substance that acts as a catalyst in living organisms, regulating the rate at which chemical reactions proceed without itself being altered in the process. Without enzymes, many of these reactions would not take place at a perceptible rate. Enzymes catalyze all aspects of cell metabolism. This includes the digestion of food, in which large nutrient molecules (such as proteins, carbohydrates, and fats) are broken down into smaller molecules; the conservation and transformation of chemical energy; and the construction of cellular macromolecules from smaller precursors.

Examples of Enzymes

Following are some of the examples of enzymes:

The enzyme pepsin, for example, is a critical component of gastric juices, helping to break down food particles in the stomach. Likewise, the enzyme amylase, which is present in saliva, converts starch into sugar, helping to initiate digestion.

In medicine, the enzyme thrombin is used to promote wound healing. Other enzymes are used to diagnose certain diseases. The enzyme lysozyme, which destroys cell walls, is used to kill bacteria.

The enzyme catalase brings about the reaction by which hydrogen peroxide is decomposed to water and oxygen. Catalase protects cellular organelles and tissues from damage by peroxide, which is continuously produced by metabolic reaction.

Functions of Enzymes

The enzymes perform a number of functions in our bodies. These include:

Enzymes help in signal transduction. The most common enzyme used in the process includes protein kinase that catalyzes the phosphorylation of proteins.

They break down large molecules into smaller substances that can be easily absorbed by the body.

They help in generating energy in the body. ATP synthase is the enzyme involved in the synthesis of energy.

Enzymes are responsible for the movement of ions across the plasma membrane.

Enzymes perform a number of biochemical reactions, including oxidation, reduction, hydrolysis, etc. to eliminate the non-nutritive substances from the body.

They function to reorganize the internal structure of the cell to regulate cellular activity

Enzyme structure

Enzymes are a linear chain of amino acids, which give rise to a three-dimensional structure.

The sequence of amino acids specifies the structure, which in turn identifies the catalytic activity of the enzyme. Upon heating, the enzyme's structure denatures, resulting in a loss of enzyme activity, which typically is associated with temperature.

Compared to its substrates, enzymes are typically large with varying sizes, ranging from 62 amino acid residues to an average of 2500 residues found in fatty acid synthase. Only a small section of the structure is involved in catalysis and is situated next to the binding sites. The catalytic site and binding site together constitute the enzyme's active site. A small number of ribozymes exist which serve as an RNA-based biological catalyst. It reacts in complex with proteins

References

Britannica, The Editors of Encyclopaedia. "What are examples of enzymes? ". *Encyclopaedia Britannica*, 18 Jul. 2019, <https://www.britannica.com/question/What-are-examples-of-enzymes>. Accessed 10 January 2025