

FUNCTIONS OF ENZYMES IN THE CELL

*prof. M.M. Ikramova,
master M.I. Tojiboyeva,*

*prof. Q.T. Tojiboyev
Andijan State University*

Department of Zoology and Biochemistry

Abstract: Enzymes, like all other catalysts, have a number of properties. First, enzymes, like other catalysts, accelerate only those chemical processes that are thermodynamically unlikely to occur spontaneously, but occur at very low rates without the participation of catalysts.

Key words: Enzyme, temperature, cell, organism, protein, hydrolysis, isomerization, reaction, catalysis

Annotatsiya: Fermentlar boshqa barcha katalizatorlar kabi, bir qator xususiyatlarga ega. Birinchidan, fermentlar boshqa katalizatorlar kabi, faqat o'z-o'zidan o'tishi termodinamik jihatidan ehtimol tutilgan, ammo katalizatorlar ishtirok etmagan juda past sur'atda o'tadigan kimyoviy jarayonlarnigina tezlatadi.

Kalit so'z: Ferment, temperatura, hujayra, organizm, oqsil, gidroliz, izomerizatsiya, reaksiya, kataliz

Аннотация: Ферменты, как и все другие катализаторы, обладают рядом свойств. Прежде всего, ферменты, как и другие катализаторы, лишь ускоряют химические процессы, самопроизвольное возникновение которых с термодинамической точки зрения маловероятно, но в которых не участвуют катализаторы.

Ключевые слова: Фермент, температура, клетка, организм, белок, гидролиз, изомеризация, реакция, катализ.

In nature, various chemical reactions that occur in all living organisms, including plant cells and tissues, proceed at relatively low temperatures and at extremely high speeds. For example, to decompose proteins, carbohydrates, or fats in laboratory conditions, it is necessary to add a strong acid or strong alkali to them and boil them at high temperatures for a long time. However, in living organisms, these substances decompose easily in a short time and at low temperatures.

Not only the decomposition reaction of substances, but also the formation of complex substances occurs easily in organisms. This is because living organisms contain special catalysts that accelerate chemical reactions. These catalysts, which are protein in nature, are called enzymes.

Enzymes differ sharply from other catalysts in some of their properties. First of all, enzymes have the property of acting extremely efficiently. Under optimal conditions (i.e., low temperature, normal pressure, and an environment with a certain value), they act much faster than inorganic catalysts. Secondly, enzymes have the property of specific action. In other words, each enzyme, as a rule, catalyzes only one chemical reaction or one group of reactions of the same type. Inorganic catalysts do not have this property.

Thirdly, biochemical processes in the cell are strictly controlled by enzymes. This property of enzymes is their integral, important property.

Fourthly, the range of reactions catalyzed by enzymes is quite wide, they catalyze a number of reactions that occur in living organisms, such as oxidation-reduction, hydrolysis, isomerization, transfer of various groups, and so on. Practically all chemical reactions that occur in living organisms occur with the participation of enzymes.

One-component and two-component enzymes. Although it is fully confirmed that enzymes obtained in pure form are protein substances, it has long been established that a number of enzyme molecules contain prosthetic groups, that is, they are complex proteins, and for the action of others, additional factors are required that are not tightly bound to the protein part, but interact with them during enzymatic catalysis.

The high-molecular protein part of the enzyme is called the apoenzyme, and the structure formed by the combination of these two components is called the holoenzyme (whole enzyme). The following properties of enzymes and catalysts should be noted:

1. They are highly effective even in very small amounts. The fact that the amount of substrate that changes with the participation of 1 mole of enzyme in 1 minute can be from 100 to 300,000 moles shows how fast the enzymatic reaction proceeds.
2. Catalysts remain unchanged at the end of the reaction. Enzymes form an enzyme-substrate complex during the reaction and enter into an intermediate reaction, but the enzyme is restored at the end of the reaction cycle. However, since enzymes are protein substances, they can undergo partial denaturation changes during the reaction.
3. The catalyst is present in the reaction medium in much smaller quantities than the substrate, does not affect the equilibrium state of the reaction and accelerates the reaction.
4. Enzymes and other catalysts also have specificity (specificity) in accelerating a chemical reaction, that is, the catalytic effect of catalysis is limited to a certain type of chemical reaction. Specificity is highly characteristic of enzymes compared to non-protein catalysts.

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