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Classification of Enzymes

Tokhirov Bakhtiyor Bakhshullayevich

Bukhara State University, Associate Professor, Ph.D

Shukurova Shaxina

Bukhara State University, Biology chair of master

Annotation: Currently, two different names for enzymes have been adopted: working and systematic. The working or rational name of an enzyme is formed by adding the suffix aza to the end of the name of the substance or reaction to which the enzyme acts. Therefore, words that end in mourning, of course, indicate a certain enzyme. This article discusses the classification and naming of enzymes.

Key words: Enzyme, systematic nomenclature, Lyases, Transferases, Isomerases, Hydrolases, ligases.

Currently, two different names for enzymes have been adopted: working and systematic. The working or rational name of an enzyme is formed by adding the suffix aza to the end of the name of the substance or reaction to which the enzyme acts. Therefore, words that end in mourning, of course, indicate a certain enzyme. For example, the enzyme that breaks down a protein is called proteinase, the enzyme that accelerates hydrolysis is called hydrolase, and the oxidizing enzyme is called oxidase. Similar enzymes that affect starch, fat, glycosides, peroxides, and urine are called amylase, lipase, glycosidase, peroxidase, and urease. The trivial names of some enzymes that have entered the scientific literature have also been preserved, such as pepsin, trypsin, papain, and others. [1-5]

Systematic naming of enzymes is more complicated. The general classification of enzymes can be based on their chemical structure or biochemical function, ie the nature of the reaction affected by the enzyme, the type of chemical change to be catalyzed, the name of the substrate and the suffix.

Classification according to the enzyme catalytic reaction can be based on the nature of the broken bonds and transfer groups or the chemical nature of the enzymes. Systematic naming is used only in the studied enzymes. At present, the general classification and indexing of enzymes is used around the world. According to this classification, approved by the Assembly of the International Union of Biochemistry in Moscow in 1961, all enzymes are divided into 6 classes, and within these classes they are divided into the smallest and smallest classes. After 1961, a standing committee was set up to revise the nomenclature and supplement it with further information in this area.

Each class of enzymes divided into 6 classes has a fixed number:

1. Oxidoreductases 4. Lyases
2. Transferases 5. Isomerases
3. Hydrolases 6. Ligases (synthetases)

The class name defines the type of reaction that the enzyme catalyzes. It follows that the reactions involving enzymes are divided into 6 types. Classes are divided into subclasses, which in turn are divided into the smallest classes. A small class determines the effect of an enzyme on the nature of

the chemical group of the substrate to which it acts. The smallest class further clarifies the action of the enzyme, clarifying the nature of the substrate bond or the nature of the acceptor involved in the reaction. [6-8]

The classification system provides a special code consisting of 4 coded numbers, separated by dots for each enzyme:

Lactate dehydrogenase 1. 1. 1. 27

Oxidoreductases - enzymes that catalyze redox reactions. This class includes all dehydrogenases, oxidases, peroxidases, cytochrome reductases. Oxidoreductases are divided into 17 subclasses. The substrate to be oxidized by oxidoreductases is considered to be a hydrogen donor. For this reason, enzymes of this class are called dehydrogenases or reductases, and the term oxidase is used when they act as oxygen acceptors. The systematic name of these enzymes is as follows: donor: acceptor - oxidoreductase.

Oxidoreductases are hydrogen transfer, electron transport; catalyzes reactions such as oxidation with molecular oxygen, hydroperoxide, and other oxidizing agents. The names of some enzymes are formed as follows: donor and acceptor oxidoreductase. For example, alcohol: NAD - oxidoreductase; L-amino acid; O2 - oxidoreductase. Oxidoreductases are divided into subclasses depending on the nature of the chemical bonds and molecules they affect, and each subclass is subdivided according to the nature of the acceptor. Oxidoreductases are the largest class of enzymes. Representatives of oxidoreductases mainly fall into the following groups: [9-12]

Dehydrogenases - substrate oxidation catalyzes all reactions that take place with the release (dehydrogenation) of hydrogen (protons and electrons). The hydrogen released in the donor is transferred to various acceptors:

H H

R R¹1 R R¹

NAD and NADF are often involved as acceptors. In this case, it is accepted to express the oxidized form of NAD and NADF as NAD and NADF, the return coefficient formed after the addition of hydrogen atoms as NADH H and NADFH H. For example:

A lkogol NAD Aldegid NADH H

Oxidases - if hydrogen is transferred directly from the donor to oxygen, the enzymes that catalyze this reaction are called oxidases. These include aldehyde oxidase, glucose oxidase, amino acid oxidases, and some other flavin enzymes. For example:

α-amino acid O2 → 2-oxyacid NH3 H2O2

Cytochromes are enzymes that perform the function of electron transport in redox reactions, for example, cytochromoxidase transfers electrons from one of the cytochromes to molecular oxygen. Peroxidase and catalase are additional respiratory enzymes. They remove the toxic substance H2O2, formed during oxidation, which is performed by the transfer of hydrogen peroxidase substrate hydrogen to hydroperoxide:

H

R H2O2 → 2 H2O R

H

Catalase accelerates the breakdown of hydroperoxide into water and molecular oxygen:

2 H2O2 → 2 H2O O2

Transferases catalyze the transfer of various chemical groups and residues from one substrate (donor) to another (acceptor). Transferases are divided into 8 subclasses depending on the groups they transfer. The nature of the radicals they transport is different, and the importance and number

of enzymes belonging to this class is growing every year. Transferases are involved in many metabolic processes, transporting amino, phosphate, methyl, sulfhydryl groups, acids, glycosyls, aldehydes and ketones, single carbon residues. The systematic name of transferase enzymes is as follows: donor-acceptor - transferable group - transferase. For example, ATF: acetate-phosphotransferase; acetyl-CoA; L-glutamate-N-acetyltransferase. Transferases are also common enzymes, such as oxidoreductases. They are involved in the interaction of various substances, the synthesis of monomers, and the neutralization of natural and foreign compounds. [13-15]

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