

# Nomenclature and classification of enzymes

Researchers gave names to the first enzymes discovered to describe their function or the material from which they isolated the enzyme. This is how names such as pepsin, trypsin, and ptyalin arose. Later, the International Union of Biochemistry (IUB) established rules for the functional classification and nomenclature of enzymes.

## Systematic name

Enzyme system names are an attempt to systematically name enzymes with a true description of the reactions they catalyze. The name consists of three parts:

1. labeling of substrate and product,
2. reaction designation,
3. ending *-asa*. The enzyme L -**alanine:2-oxoglutarate aminotransferase** .
  - Substrate: L -alanine, product: 2-oxoglutarate,
  - reaction: transfer of an amino group (ie aminotransferase reaction);
  - ending *-asa*.

## Trivial Name

In ordinary communication, trivial names are used rather than systematic names. They are shorter, easier to remember and do not contain characters that cannot be pronounced. There are no rules for creating trivial names, but often these names describe the substrate and type of reaction (e.g., alanine aminotransferase). Some historical trivial names (eg trypsin) are also used.

In addition to the forward reaction, a number of enzymes catalyze the corresponding reverse reaction. Since it is still a single enzyme molecule, usually only one enzyme name is used, even though it describes well only one direction of the reaction.

## Classification of enzymes

Even the systematic names of enzymes are not unambiguous - in nature we often find several different enzymes that are products of different genes, but catalyze the same reaction. These are the so-called isoforms of enzymes, i.e. *isoenzymes* . The only unambiguous designation of a specific enzyme is its code number according to the so-called **EC classification** ( *Enzyme Commission* ).

*The EC number* consists of the abbreviation EC and four numbers separated by periods. The first number is the so-called **class of the enzyme** , which indicates the type of catalyzed reaction. This is followed by **subclass** and **subsubclass** , which further characterize the type of reaction and the substrates involved. The last, fourth number is the serial number.

## Classes of enzymes

**EC 1 - oxidoreductases** : catalyze redox processes (transfer of hydrogen, oxygen or only electrons);

subclasses are e.g. *dehydrogenases, oxidases, oxygenases, hydroxylases, cytochromes* .

**EC 2 - transferases** : transfer functional groups (for example methyl-, acetyl- or phosphate group);

e.g. *aminotransferases, transglycosylases, transmethylases, hexokinases* .

**EC 3 - hydrolases** : catalyze hydrolytic cleavage;

e.g. *proteases, lipases, esterases, glycosidases* .

**EC 4 - lyázy**: štěpí C-C a C-N vazby bez vstupu vody. Lyáza katalyzující reakce syntetické se nazývá syntáza;  
*aldolázy*.

**EC 5 - isomerases** : catalyze isomerization reactions;

*cis-trans isomerases, epimerases, mutases, racemases* .

**EC 6 - ligases (synthetases)** : connect two molecules by covalent bond using ATP;

eg synthesis of nucleic acids or proteins.

**EC 7 - translocases** : Transport of substances, most often through biological membranes; some translocases require ATP; this class was newly introduced in 2018.

## Links

### External links

- [wikipedia:cs:Enzym Enzyme]

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## References

- LEDVINA, Miroslav, et al. *Biochemistry for medical students. Part I*. 2nd edition. Prague: Karolinum, 2009. 269 pp. ISBN 978-80-246-1416-8 .
- MURRAY, Robert K. *Harper's Biochemistry*. 2nd edition. Jinočany: H&H, 2002. 871 pp. ISBN 80-7319-013-3 .

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