

## Enzyme Nomenclature

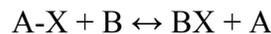
Enzymes are classified into six different groups according to the reaction being catalyzed. The nomenclature was determined by the Enzyme Commission in 1961 (with the latest update having occurred in 1992), hence all enzymes are assigned an “EC” number. The classification does not take into account amino acid sequence (ie, homology), protein structure, or chemical mechanism.

EC numbers are four digits, for example a.b.c.d, where “a” is the class, “b” is the subclass, “c” is the sub-subclass, and “d” is the sub-sub-subclass. The “b” and “c” digits describe the reaction, while the “d” digit is used to distinguish between different enzymes of the same function based on the actual substrate in the reaction.

### The Six Classes

**EC 1. Oxidoreductases** – catalyze the transfer of hydrogen or oxygen atoms or electrons from one substrate to another, also called *oxidases*, *dehydrogenases*, or *reductases*. Note that since these are ‘redox’ reactions, an electron donor/acceptor is also required to complete the reaction.

**EC 2. Transferases** – catalyze group transfer reactions, excluding oxidoreductases (which transfer hydrogen or oxygen and are EC 1). These are of the general form:



**EC 3. Hydrolases** – catalyze hydrolytic reactions. Includes *lipases*, *esterases*, *nitrilases*, *peptidases/proteases*. These are of the general form:



**EC 4. Lyases** – catalyze non-hydrolytic (covered in EC 3) removal of functional groups from substrates, often creating a double bond in the product; *or* the reverse reaction, ie, addition of function groups across a double bond. Includes *decarboxylases* and *aldolases* in the removal direction, and *synthases* in the addition direction.

**EC 5. Isomerases** – catalyzes isomerization reactions, including racemizations and cis-trans isomerizations.

**EC 6. Ligases** -- catalyzes the synthesis of various (mostly C-X) bonds, coupled with the breakdown of energy-containing substrates, *usu.* ATP

The various sub<sub>n</sub>-classes are defined based on the primary class. A list of the subclasses for each class is given below. Additional information on the sub-subclasses and sub-sub-subclasses (ie, full enzyme classification and names) can be found at the referenced web link.

*From the Web version, <http://www.chem.qmul.ac.uk/iubmb/enzyme/index.html>*

### **Enzyme Subclasses**

The links are to a list of **sub-subclasses** which in turn list the enzymes linked to separate files for each enzyme, *or* to a list as part of a file with **up to 50** enzymes per file.

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