

Sub-classes of oxido-reductases are →

- 1) dehydrogenases
- 2) oxidases
- 3) Reductases
- 4) Peroxidases
- 5) Catalase
- 6) Oxygenase
- 7) Hydroxylases

→ X -----

② Transferases →) X X

Def → This class of enzymes transfers functional group (other than hydrogen) from one substrate to another substrate.

Example Reaction →) X

⇒ X

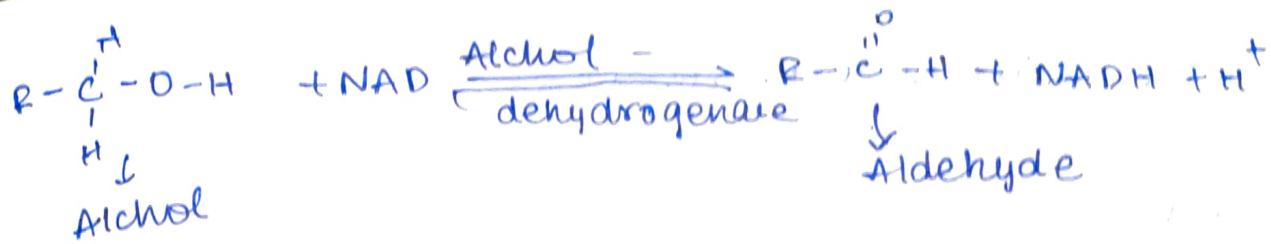
① dehydrogenase → An enzyme that catalyse the removal of hydrogen atoms from a particular molecule.

eg: Alcohol NAD oxido-reductase

(catalyse the oxidation of an alcohol to aldehyde).

→ This enzyme removes two electrons (or) two hydrogen from the alcohol to yield an aldehyde.

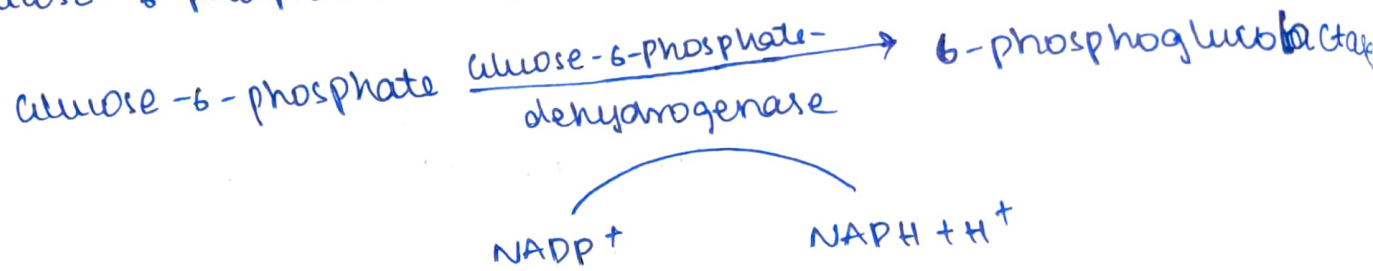
→ The two electrons which are originally in the carbon-hydrogen bond of the alcohol are transferred to NAD, which then become reduced.



- ② Oxidases → Transfer two electrons from the donor to oxygen (oxygenation oxidation reactions)
eg: Glucose oxidase
- ③ Reductases → An enzyme that catalyse the reduction
eg: S-α-reductase
- ④ Peroxidases → To breakdown of peroxide Bonds.
eg: Thyroid Peroxidase.
- ⑤ Catalase → Catalyzes the decomposition of H_2O_2 (Hydrogen peroxide) to water and oxygen.
- ⑥ Oxygenases → Oxygenase catalyze the incorporation of Both atom of oxygen (which means 2 oxygen atoms) into a single substrate.
eg: Catechol oxygenase.
- ⑦ Hydroxylases → which add a hydroxyl group to organic compounds
eg: ~~Ty~~ Tyrosine hydroxylase.

example for nomenclature & classification

→ Glucose-6-phosphate dehydrogenase



Trivial Name - Glucose-6-phosphate dehydrogenase

IUB Name - Glucose-6-phosphate NADP oxidoreductase

code NO : → EC 1.1.1.49.

② Transferases →

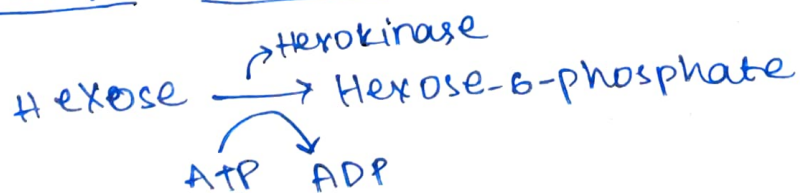
Main class → ②

→ This class of enzymes transfers one group (functional group other than Hydrogen) from the substrate to another substrate.

Reaction model



example reaction →



→ The name of enzyme in this reaction is hexokinase

Sub classes →

- ① Transaldolases
- ② Transketolases
- ③ Acetyl transferase
- ④ Methyl transferase
- ⑤ glucosyl transferase. (glucosyl transferase)
- ⑥ phosphoryl transferase
- ⑦ kinases
- (⑧ phosphomutases) × ⑧ Trans aminases:

Transaminases →

- Also called Amino transferases
- These enzymes transfer the amino group from one amino acid to a keto acid acceptor resulting in the formation of a new amino acid and a new keto-acid.

eg: Alanine transaminase
Aspartate transaminase.

Kinases →

- They are the phosphorylating enzymes that catalyses the transfer of phosphoryl group from ATP or other nucleoside triphosphate to alcohol or amino group acceptors.

eg: Hexokinase
glucokinase.

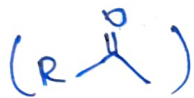
glycosyl transferases →

which catalyze the transfer of an activated glucose residue to a glucogen primer

eg: glycogen synthase
glycogen phosphorylase.

Acyl transferases →

~~That~~ The enzymes that acts on acyl groups.



eg: Glycerone phosphate-O-acyltransferase

Leithin-cholesterol acyl transferase

Methyl transferases →

→ large group of enzymes that methylate their substrates.

eg: Histone methyl transferases

DNA/RNA methyl transferases.

Transketolases and Transaldolases →

Transketolases transfers a two carbon unit whereas Transaldolases transfers a three carbon unit.

eg: Erythrocyte transketolase

Fructose-6-phosphate aldolases

example for nomenclature & classification →

example → hexokinase.

Systematic name → ATP-Hexose-6-phosphate transferase

code number → EC. 2.7.1.1

③ Hydrolases →

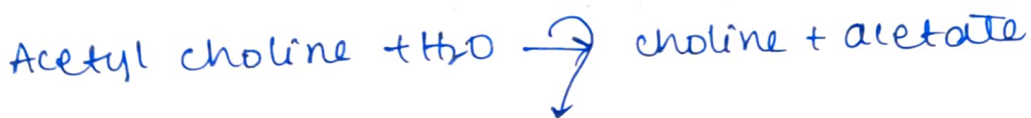
Def → This is a class of enzymes that commonly perform as biochemical catalyst that use water to break a chemical bond which typically results in dividing a large molecule to smaller molecules.

→ These enzymes hydrolyse ester, ether, peptide or glycosidic bonds

Reaction Model



Example Reaction



Acetylcholine esterase.

Sub-classes

① esterases

② nucleases

③ phosphoesterases

④ lipases

⑤ phosphatase

⑥ DNA glycosylase

⑦ glycosidase

⑧ proteases

⑨ heliases

⑩ GTPase.

⑪ phospholipases

⑫ Amidases

⑬ Ribonucleases

⑭ Theolases

proteases/peptidases $\rightarrow$

is an enzyme that catalyses the breakdown of proteins into smaller polypeptides or single amino-acids.

eg: plasmin, Thrombin, pepsin, Trypsin

helicases - class of enzymes, that helps in unpackage an organism's genes

eg: DNA Helicase
RNA Helicase.

GTPase - are a large family of hydrolase enzyme that bind to the ~~ATP~~ G.T.P and Hydrolyse to G.DP.

phospholipases - hydrolyses phospholipids into fattyacids.

eg: phospholipase A, B, C and D.
Endothelial Lipase.

Amidases - Catalyzes the hydrolysis of amide

eg: Deaminase

Ribonuclease - is a type of nuclease that catalyses the degeneration of RNA into smaller components.

eg: RNAase A
RNAase H.

example for nomenclature & classification →

enzyme name → Acetyl choline esterase

systematic name → Acetyl choline Hydrolase.

code no → EC 3.1.1.7

④ LYASES →

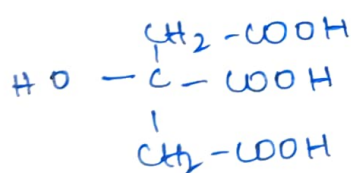
Def → These enzymes can remove groups from substrate (or) break bonds by mechanisms other than Hydrolysis.

→ These are the enzymes which add or remove the electrons of water, ammonia, (or) CO_2 .

model reaction →

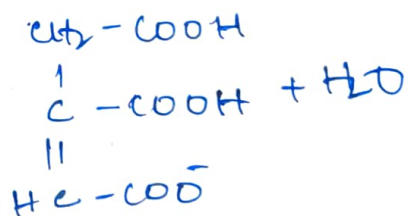


example reaction →



Citrate

Citrate dehydrogenase →



Cis-Aconitate

Subclasses →

- ① Decarboxylases
- ② Aldolases
- ③ ~~Hydratases~~
- ④ Synthases.

Decarboxylase →

removes the ~~element~~ CO_2 from α - or β -ketoacids (or) amino acids.

Nomenclature

4.1 → cleave C-C-Bonds.

4.1.1 → decarboxylase

4.1.2 → Aldehyde lyases

4.1.3 → Oxacid lyases

4.2 → cleave C-O-Bonds.

4.3 → cleave C-H-Bonds

4.4 → cleave C-S-Bonds.

4.5 → cleave C-X Bonds

4.6 → cleave C-P Bonds.

Example

① malate lyase

code no: E.C → 4.2.1.2

② Aldolases

systematic name → ketose -4-phosphate aldolase - lyase.

code no → 4.1.2.7.

⑤ Isomerases →

→ This is very heterogeneous group of enzymes that catalyse isomerization of several that include cis-trans, keto-enol, etc.

→ These enzymes can produce optical, geometric or positional isomers of substrates.

→ Isomerases that catalyze inversion of asymmetric carbons are either epimerases or racemases.

Subclasses →

① ~~Racemases~~

② epimerases

③ ~~epi-mutases~~

④ cis-trans isomerases

⑤ phospho-mutase.

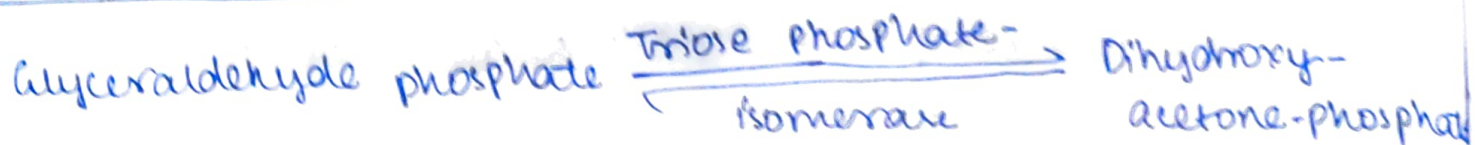
(i) Epimerases → Target molecules with multiple chiral carbons by acting on one of them.

(ii) Racemases → mainly act on molecules with only one chiral carbon atom by stereo-chemical inversion.

(iii) cis-trans isomerase → Catalyze the isomerization of a cis-trans isomers.

(iv) phosphomutases → Involves the intramolecular transfer of a group such as phosphoryl.

Example reaction



Nomenclature

Trivial name of the above enzyme $\rightarrow$ Triose phosphate isomerase

Systematic name — Glyceraldehyde-3-phosphate keto-isomerase.

Code no $\rightarrow$ ~~EC~~ $\rightarrow$ 5. EC.5.3.11

⑥ LIGASES $\rightarrow$

$\rightarrow$ These enzymes having two substrates together, usually with the simultaneous hydrolysis of ATP.

A.

Model reaction

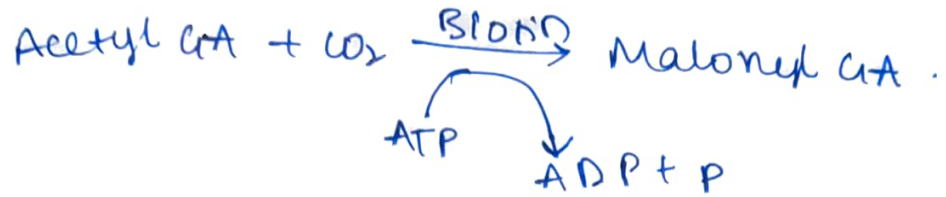


⑦ Subclasses

① Synthetases

② Carboxylases.

example reaction →



nomenclature

enzyme name → Acetyl CoA carboxylase

code no → E.C 6.4.1.2.

7) Translocase (EC-7)

- $\rightarrow$ Translocase is a general term for a protein that assists in moving another molecule usually across a cell membrane

$\rightarrow$ These enzyme catalyze the movement of ions or molecules across membranes or their separation within membranes

EC 7.1 - catalyzing the translocation of inorganic substrates

EC 7.2 Catalyzing the translocation of organic cations

EC 7.3 Catalyzing the translocation of organic anions

EC 7.4 Catalyzing the translocation of aminoacylated peptides

EC 7.5 Catalyzing the translocation of carbohydrates

EC 7.6 " " other coupling

examples

(8)

1) Ornithine translocases

2) (carnitine acyl) carnitine translocases



eg. H^+ translocating, two sectors ATPase



From

So Na^+/K^+ ATPase pump - EC 7.2.2.13

1 - translocase class

2 - translocating pre-catalyzed the translocation of inorganic cations and their helates

2. translocating inorganic cations linked to the chelation of a nucleoside triphosphate

13 - Induced enzyme