

Enzyme Classification

FB: Neet Near Me

Classification of Enzymes

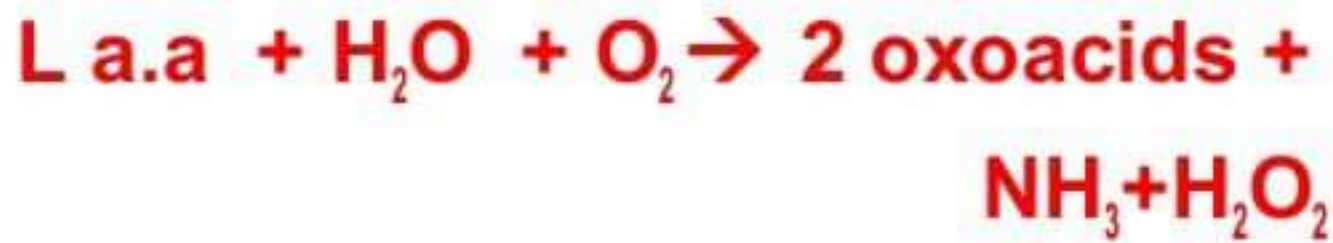
- According to the International Union of Biochemistry or Biochemists Enzymes are classified into SIX major classes

- ❑ **Class I – Oxidoreductases,**
catalyze oxidation reductions
- ❑ **Class II – Transferases**
Catalyzing group transfer
- ❑ **Class III– Hydrolases**
Catalyzing hydrolysis
- ❑ **Class IV– Lyases**
Catalyzing addition of groups to
= bonds
- ❑ **Class V -- Isomerases**
Catalyzing isomerization
- ❑ **Class VI – Ligases**
Catalyzing condensations

I Oxidoreductases

- They catalyze oxidation and reduction reaction. These enzymes are divided into three groups.

(a) Oxidases: Those which use oxygen as hydrogen acceptor
eg:- L amino acid oxidases.



**Eg: D-amino acid oxidases,
Tyrosinase, Cyt-oxidases, Uricases.**

(b) Anaerobic Dehydrogenases

- ❑ Those which use some other substances as Hydrogen acceptor , eg: NAD,NADP

Enz: 1) Malate Dehydrogenase

2) Succinate Dehydrogenase

3) Lactate Dehydrogenase.

These anaerobic dehydrogenases can further be sub-classified as

(i) Those acting on CH-OH of donors

eg: Glycero-P-dehydrogenase



Other eg:-- lactate Dehydrogenase

Malate Dehydrogenase

Isocitrate Dehydrogenase

(ii) Those acting on CH-CH group of donors
eg: Dihydrouracil dehydrogenase



(iii) Those acting on CH-NH₂ group of donor
with NAD or NADP as acceptor.

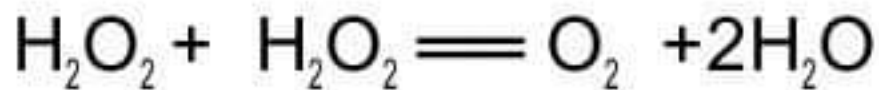
eg: Glutamate Dehydrogenase



(c) Hydroperoxidases

- Acting on H_2O_2 as acceptor, or those which use hydrogen peroxide as substrate.

eg: Catalase , Peroxidase



II Transferases

- They catalyze the transfer of some groups from one molecule to the other.

(1) Methyl Transfer: **Methyl transferases**

- a. **S-adenosyl Methionine + Guanidino acetate**

|| ***Guanidino acetate Methyl transferase***

S-adenosyl homocysteine + Creatine

- b. **Serine hydroxy methyl transferase**
Serine → Glycine

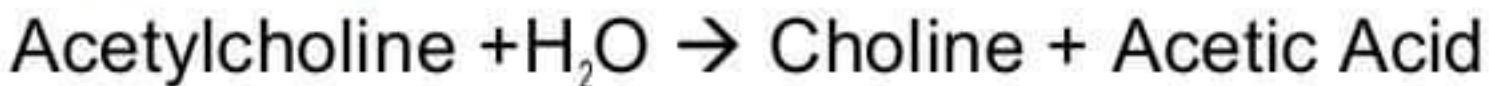
- (2) Carboxyl transfer-- eg: **Aspartate Transcarbamylase**
- (3) Aldehyde, Keto Residue Transfer--eg: **Transaldolase, Transketolase**
- (4) Glucosyl Transfer--eg: **Transglucosylase**
- (5) Amino Grp Transfer--eg: **Transaminases**
- (6) Phosphorus Transfer eg: **Glucokinases, Hexokinases**
- (7) Transferring Sulphur-- eg: **Trans-sulfurase**
- (8) Acyl Transferases—eg: **Transacylases**

III Hydrolases

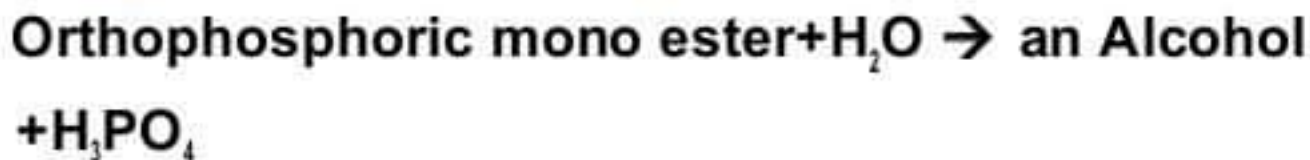
- They catalyze the hydrolysis of substrate by addition of water molecule across the bond which they split

(I) Acting on Ester bonds-Esterases

- (a) Acetylcholine-esterase



- (b) Alkaline Phosphatase



(ii) Acting on Glycosyl compound

- Amylases → β galactosidases

(iii) Acting on Peptide bonds

- Peptidases →
aminopeptidases, carboxypeptidases

(iv) Acting on C-N bonds

- Deamidases → Urease (Urea Amido Hydrolase)
Eg: $\text{Urea} + \text{H}_2\text{O} = \text{CO}_2 + 2 \text{NH}_3$

(v) Acting on Acid Anhydride bonds

(a) Pyrophosphate Phosphorylase (Synthetic Name)

- This enzyme is also called Inorganic pyrophosphatase (trivial name)
- **$\text{Pyro PO}_4 + \text{H}_2\text{O} \rightleftharpoons 2 \text{ ortho phosphate}$**

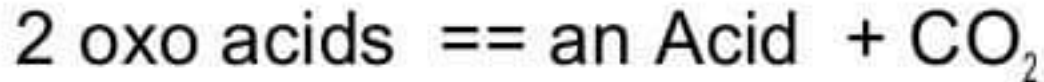
(b) ATP Phospho Hydrolase (synthetic name)

- ATP ase (trivial name)
- **$\text{ATP} + \text{H}_2\text{O} \rightleftharpoons \text{ADP} + \text{ orthophosphate}$**

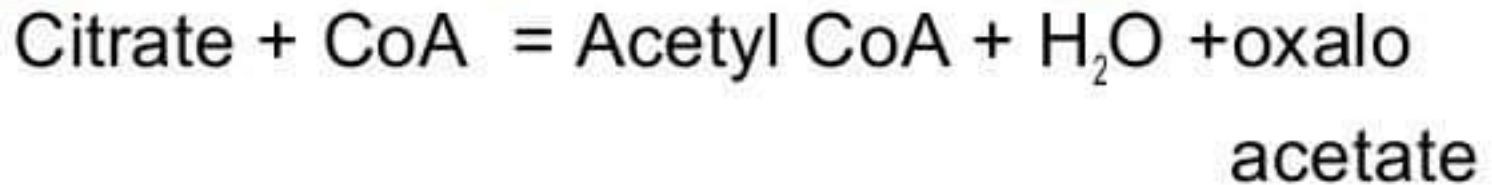
IV .Lyases

- They catalyze the splitting of group from substrate without hydrolysis or oxidation, reduction.

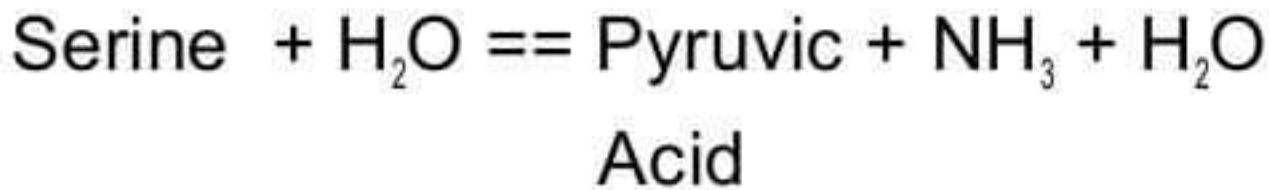
(i) C-C Lyases : Pyruvate Decarboxylase



(ii) Keto Acid Lyase : Isocitrate Lyase



(iii) C-oxylyase : Serine Hydrolyase or
Serine Hydratase



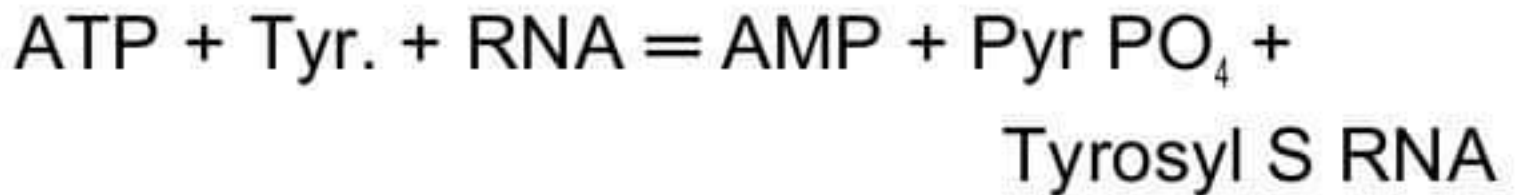
V Isomerases

- They catalyze isomeric conversions or epimeric conversions.
- Eg: Isomerases, Racemases, Epimerases

Fb/neetnearme

VI- Ligases

(i) Tyrosine S RNA Ligase or Tyrosyl RNA Synthetase.



(ii) CTP Synthetase

(iii) GMP Synthetase.

Ligases can join or form

- C-O bonds →

Tyrosyl S. RNA Synthetase

Leucyl S.RNA Synthetase

Alanyl S.RNA Synthetase

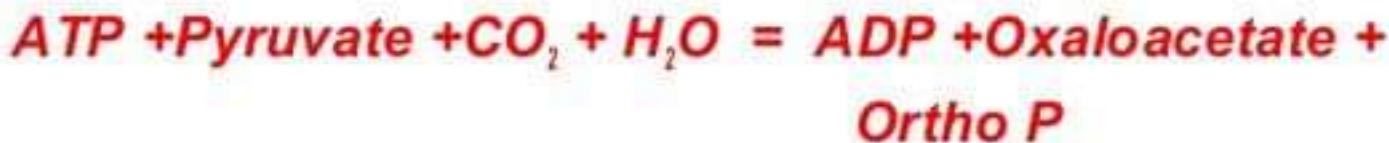
- C-N bonds →

GMP Synthetase

CTP Synthetase

- C-C bonds →

(i) Pyruvate CO₂ Ligase or Pyruvate Carboxylase



(ii) Acetyl CoA CO₂ Ligase or Acetyl CoA Carboxylase

