

Enzymes is a type of biocatalyst which is formed inside the living cell of organism. it increases the rate of reactions of living body but can not take part in reactions i.e. it comes out in unchanged form at the end of reaction. The first enzyme for fermentation was first time extracted from yeast cells by Dr. Buchner in 1897 in the form of enzyme. Later other enzyme was isolated by Dr. Sumner in the form of urease. Enzyme can act both outside the cell at its formation. If enzymes can act outside the cell then called exoenzyme and if acts inside the cell then called endoenzyme.

On the basis of chemical composition enzymes are of two types: —

(1) APOENZYME (2) HOLOENZYME.

1. **APPOENZYMES OR SIMPLE ENZYME:**— Such type of enzymes are purely made by proteins.
2. **HOLOENZYME OR CONJUGATED ENZYMES:**— Such type of enzymes are made by proteins as well as some non proteinous groups. These non proteinous groups are called prosthetic groups.  
i.e. **Apoenzyme + Prosthetic group = Holoenzyme**

The prosthetic groups are of two types:— (i) **COENZYMES:**— These prosthetic groups take part in group transfer reaction. Some examples are NAD (Nicotinamide adenine dinucleotide) and FAD (Flavin adenine dinucleotide) which react with  $H_2$  and convert into  $NADH_2$  and  $FADH_2$  respectively. After handing over its  $H_2$  to any substrate it again converts into NAD and FAD respectively.

(ii) **ACTIVATOR:**— These prosthetic groups are found in the form of metal or non metal ions like  $Mg^{++}$ ,  $Mn^{++}$ ,  $Ca^{++}$ ,  $Fe^{++}$  etc. These activator take part in oxidation and reduction by exchange of electrons.

### PROPERTIES OF ENZYMES:—

#### (A) PHYSICAL PROPERTIES:—

- (i) Enzymes are either completely or partially made by proteins hence it shows proteinous properties.

(2)

(II) Enzymes are Colloidal in nature hence it provides large surface area for reactions.

### (B) CHEMICAL PROPERTIES (CATALYTIC PROPERTIES):

The properties of enzymes similar to inorganic Catalysts are as follows:—

- (i) Enzymes are required in very minute quantity.
- (ii) Enzymes neither start the reaction nor stop it.
- (iii) Enzymes can not take part in reaction but increases the rate of reaction.
- (iv) Enzymes are specific in action i.e. it can act with particular substrate.
- (v) Maximum enzymes can show the reversible reactions.

### (C) NON CATALYTIC PROPERTIES:— The properties of enzymes dissimilar from Catalyst are as follows:—

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- (i) Enzymes are more sensitive ~~at~~ even in small change of temperature, pressure and pH value.
- (ii) Enzymes are much efficient than inorganic catalyst.

11 (2nd PDF) Kind of Enzymes. Date-06/02/2024.  
KINDS OF ENZYMES — Enzymes are mainly classified into six groups: —

1. OXIDOREDUCTASES: — These enzymes are necessary for oxidation and reduction reactions by transfer of hydrogen from one molecule to another. These enzymes are mainly of two types: —

(a) OXIDASE: — These are necessary for transfer of hydrogen from one molecule of oxygen.  
e.g — cytochrome oxidase.

(b) DEHYDROGENASES: — These are necessary for transfer of hydrogen from one molecule to a coenzyme like NAD FAD etc.  
e.g: — Succinic dehydrogenase.

2. TRANSFERASE: — These enzymes are necessary for transfer of any chemical group from one substrate to another. e.g: — phosphotransferase.

3. HYDROLASES: — These enzymes are necessary for hydrolysis reactions i.e. breakdown of large molecules by addition of water. e.g: —  
Amylase, Lipase.