

ENZYMES

Enzymes are biological catalyst which speed up a chemical reactions without alter itself. The term enzyme was first of all used by German scientist Winhelm Kuhne in 1878

characteristics of Enzyme

Enzymes are the biochemical catalyst and posses the following important characteristics

- ① Nature: Enzymes are proteins in nature and are secreted by cells.
- ② Catalyst: They act like catalyst and speed up a biochemical reactions
- ③ Specific for Reaction: Enzymes are specific in action, they are not specific only for substrate but also for the kind of biochemical reactions.
- ④ Used in small amount: Enzymes are required in very small amount as compared to the amount of substrate.
- ⑤ Specific active center: Enzyme have specific active center called active site, which is attached to the substrate.
- ⑥ Sensitivity: Enzyme are sensitive to the changing of temperature, PH, etc. these may stop their activity.
- ⑦ Intracellular Enzymes: some enzyme are found inside the cells called intracellular enzymes. e.g mitochondria enzymes.

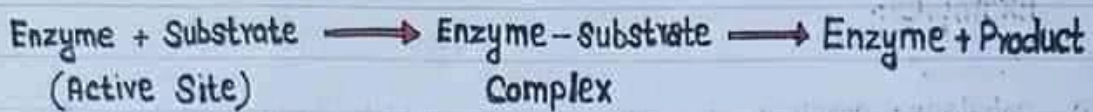
- ⑧ Extracellular Enzymes: some enzymes work outside the cells called extracellular enzymes, e.g. lipase, amylase, pepsin, etc.
- ⑨ Remain unaltered: Enzymes are not consumed during the biochemical reactions and can be used again and again.
- ⑩ Lower the activation energy: Enzymes do not initiate the reaction but increase the rate of reactions by lowering the activation energy which is required for substrate.
- ⑪ Enzyme Inhibitors: Some substances interact with enzyme to prevent it from working is called enzyme inhibitors, e.g. poison, drugs, etc.
- ⑫ Need a factor: some enzymes work properly when a cofactor is attached.

Cofactor: Cofactor is a non-protein organic chemical compound that is required for an enzyme as catalyst. It can be considered helper molecules for enzymes. The main type of cofactor is, prosthetic groups, coenzyme and activators.

- ① Prosthetic groups: It is a type of cofactor that is firmly bound to enzyme and can not be removed without denaturing is called prosthetic groups, e.g. Flavin mononucleotide (FMN) Flavin adenine dinucleotide (FAD).
- ② Coenzyme: type of cofactor derived from vitamins that is loosely bound to the enzymes and can be readily separated from enzyme is called coenzyme.
- ③ Activators: These are metal ions which form temporary attachment with enzyme, e.g. zinc, iron, etc.

MECHANISM OF ENZYME ACTION

There is a small portion in enzyme that is involved in catalysis. It is in the form of a depression or "pocket" on the surface of enzyme molecule. When an enzyme attached with the substrate, it form enzyme substrate complex (ES) the active site of enzyme catalyzes the reactions and into product, the enzymes substrate complex breaks and the enzyme and the product are released



There are two models which explain mechanism of enzyme action.

Lock and Key model:- This model was presented by a german scientist Emil Fisher in 1894

According to this model enzyme act as a lock and substrat act as key.

Main Points:- As one specific key can open only a specific lock. In the same manner the specific enzyme can transfer only specific substrate into products. The enzyme must have the correct geometric shape to fit the substrate

According to this model the active site has rigid structure. There is no modification in the active site before, during or after the reaction.

