



SNS COLLEGE OF TECHNOLOGY

AN AUTONOMOUS INSTITUTION

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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

19GET277 – BIOLOGY OF ENGINEERS

IV YEAR / VII SEMESTER

UNIT 1- INTRODUCTION TO LIFE



ENZYMES



Definition

- Enzymes can be defined as biological polymers that catalyze biochemical reactions.”
- The majority of enzymes are proteins with catalytic capabilities crucial to perform different processes. Metabolic processes and other chemical reactions in the cell are carried out by a set of enzymes that are necessary to sustain life.

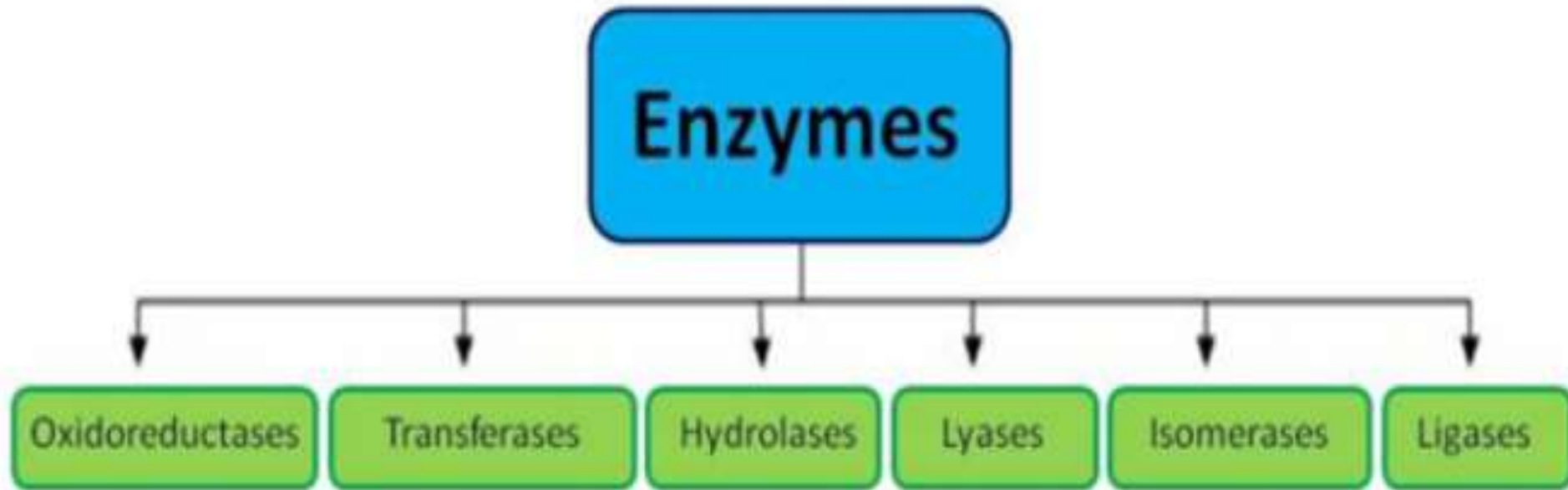


Enzyme Structure

Enzymes are a linear chain of amino acids, which give rise to a three-dimensional structure. The sequence of amino acids specifies the structure, which in turn identifies the catalytic activity of the enzyme. Upon heating, the enzyme's structure denatures, resulting in a loss of enzyme activity, which typically is associated with temperature.



Enzyme Classification





Biological Property of Enzymes

Types	Biochemical Property
Oxidoreductases	The enzyme Oxidoreductase catalyzes the oxidation reaction where the electrons tend to travel from one form of a molecule to the other.
Transferases	The Transferases enzymes help in the transportation of the functional group among acceptors and donor molecules.
Hydrolases	Hydrolases are hydrolytic enzymes, which catalyze the hydrolysis reaction by adding water to cleave the bond and hydrolyze it.
Lyases	Adds water, carbon dioxide or ammonia across double bonds or eliminate these to create double bonds.
Isomerases	The Isomerases enzymes catalyze the structural shifts present in a molecule, thus causing the change in the shape of the molecule.
Ligases	The Ligases enzymes are known to charge the catalysis of a ligation process.



Cofactors

Cofactors are non-proteinous substances that associate with enzymes. A cofactor is essential for the functioning of an enzyme. An enzyme without a cofactor is called an apoenzyme. An enzyme and its cofactor together constitute the holoenzyme.

There are three kinds of cofactors present in enzymes:

- **Prosthetic groups:** These are cofactors tightly bound to an enzyme at all times. FAD (flavin adenine dinucleotide) is a prosthetic group present in many enzymes.
- **Coenzyme:** A coenzyme binds to an enzyme only during catalysis. At all other times, it is detached from the enzyme. NAD^+ is a common coenzyme.
- **Metal ions:** For the catalysis of certain enzymes, a metal ion is required at the active site to form coordinate bonds. Zn^{2+} is a metal ion cofactor used by a number of enzymes.



Function of Enzymes

The digestive system: Enzymes help the body break down larger complex molecules into smaller molecules, such as glucose, so that the body can use them as fuel.

DNA replication: Each cell in the body contains DNA. Each time a cell divides, the cell needs to copy its DNA. Enzymes help in this process by unwinding the DNA coils.

Liver enzymes: The liver breaks down toxins in the body. To do this, it uses a range of enzymes that facilitate the process of destroying the toxins.



Other activities enzymes help with include:

- Hormone production
- Cell regulation
- Creating movement to make the muscle contract
- Transporting materials around a cell
- Respiration
- Signal transduction