Course BSH-122

Credit-3(2+1)

Enzymes, Properties and Functions

Lecture-1

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Enzymes, Properties and Functions

What is enzyme:

- Enzymes are proteins that help speed up chemical reactions in our bodies.
- Enzymes are essential for digestion, liver function and much more.
- Too much or too little of a certain enzyme can cause health problems.
- Enzymes in our blood can also help healthcare providers check for injuries and diseases.

How do enzyme work:

- Enzymes are not living organisms, they are biological substances that catalyse very specific biochemical reactions.
- When enzymes find their designated substrate, they lock on and transform them, and then continue to the next substrate molecule.

Enzyme

- Enzyme are biological catalysts.
- Which required in all biochemical reaction in living organisum.
- Enzyme increase the rate of biochemical reaction in living system.
- They are found in yeast.
- The term enzyme was coined by Friedrich Wilhelm Kuhne in 1878.

Substrate

- Substrate is a molecule upon which an enzyme acts.
- Enzyme catalyze chemical reaction involving the substrate.

Ribozyme

- Ribozyme are certain RNA also show highly substrate specific catalytic activity. Its called ribozyme.

Cofactors

- The inorganic ions such as magnesium, zinc and chloride are required for the catalytic activity of an enzyme are called cofactors.

Holoenzyme

- Holoenzyme a biochemical active compound formed by the combination of coenzyme and apoenzyme.

Coenzyme

- They are non protein organic molecules required for enzyme activity its called coenzyme.

Apoenzyme

- Apoenzyme is the protein part of an enzyme its called apoenzyme.

Isoenzyme

- Certain enzyme which formed by genetical changes specially by the processes which form alleles and iso-alleles are known as isoenzyme.
- Isoenzyme show verysmall differences in the molecular structure with that of original enzyme.
- Physically and chemicaly the enzyme and isoenzyme are very simillar and they catalyse the same reaction.
- Example of isoenzyme Lactate dehydrogenase, creatine phasphokinase and alkaline phasphatase

Nomenclature of Enzymes

In early days the suffix – ase was added to the substrate for naming the enzymes.

Example : Lipase acts on lipids.

- These names are known as trivial names. They do not convey complete information about the enzymatic reaction.
- The International Union of Biochemistry and Molecular Biology (IUBMB) have assigned a systematic nomenclature for enzymes. The systematic name has two parts.
- The first part represents the substrate. In enzyme catalyzed reactions the reactants are known as substrates.
- The second part, ending in –ase, indicates the type of reaction catalysed.

Each enzyme is assigned a four-digit code number called Enzyme Commission (EC) number.

- The first digit represents the major class to which the enzyme belongs.
- The second digit denotes the subclass.
- The third digit denotes the sub-sub class of the enzyme within the major class.
- The fourth digit represents the serial number of the enzyme within the sub-sub class.

Classification of Enzyme

Theyare 6 type:

1. Oxidoreductases enzyme
2. Transferases enzyme
3. Hydrolases enzyme
4. Lyases enzyme
5. Isomerases enzyme
6. Ligases enzyme

1. Oxidoreductases enzyme

- Oxidoreductases are enzyme involved in the oxidation and reduction of the substrates.
- They catalyse addition of oxygen and removeof hydrogen its called Oxidoreductases enzyme.
- They are 3 types:

I. Oxidase
II. Oxigenase
III. Dehydrogenase

- Example of oxidoreductases enzymes:

1. Alcohal dehydrogenage
2. Xanthine oxidase
3. Gluthathione reductase

2. Transferases enzyme

- Transferases are those enzyme which catalyze the transfer of functional group from one substrate to an other substrate.
- They are two types of transferases enzyme:

I. Amino transferases enzyme
II. Phaspho transferases enzyme

- Example of transferases enzymes:

1. Glutamate oxaloacetate transaminase.
2. Hexokinase.
3. Glucose-1-phasphate uridyl transferase.

3. Hydrolases enzyme

- Hydrolyses are enzyme cleavage of a substrate by the addition of a one molecule of water is called hydrolases enzyme.
- They are two type:

1. Peptidases enzyme
2. Glucosidases enzyme

- Example of hydrolases enzymes:

- Glucose-6-phasphate
- Amylose
- Pepsine

4. Lyases enzyme

- Lyases are enzyme catalyse the removal of a small molecule such as water and ammonia or carbon dioxidefrom a larg substrate and clavage of a substrate without addition of water.
- Example of lyases enzymes:
- Fumarase and
- Pyruvate de corboxylase

5. Isomerase enzyme

- These are involved in the isomerization of a substrate and catalyze inter conversionof one isomeric from to the other.
- Example of isomerase enzymes:

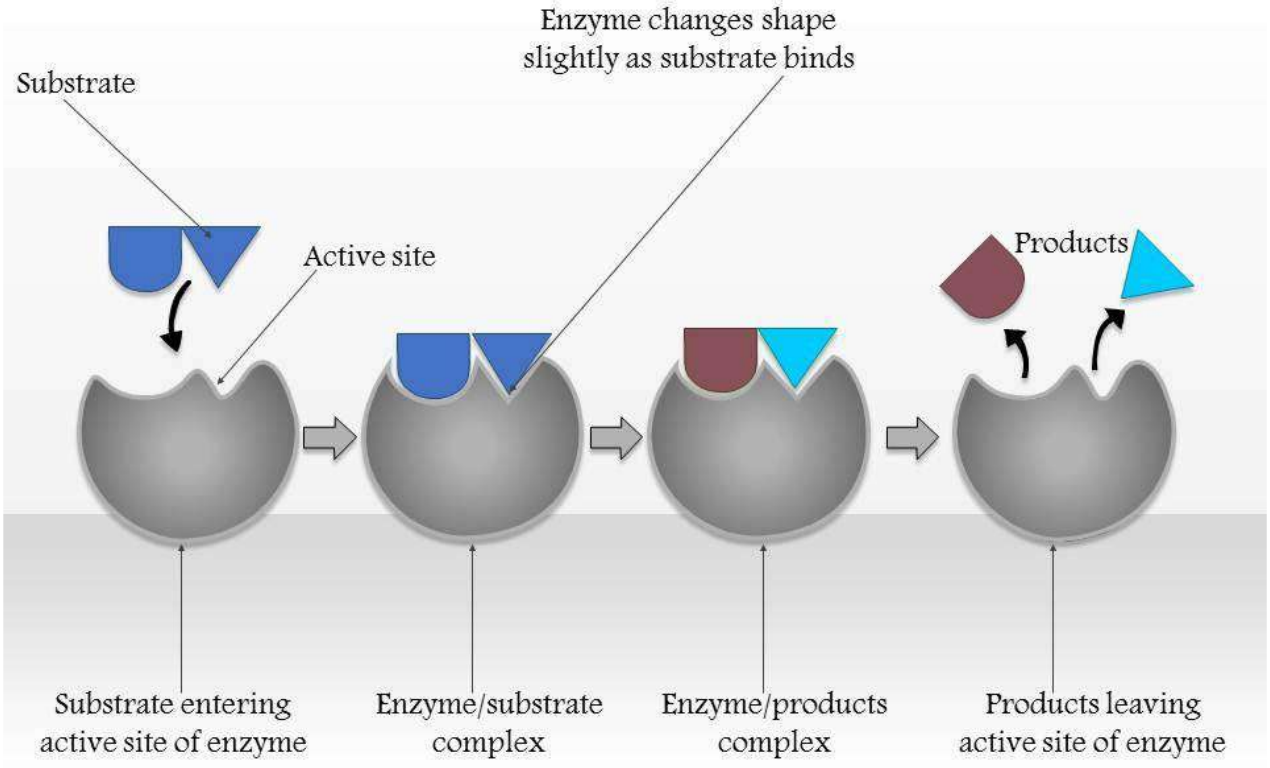
I. Phasphohexose isomerase and

II. Phasphoglucomutase

6. Ligases enzyme

- Ligases are enzyme that can catalyse the joining of two larg molecules by forming a new chemical bond.
- Ligases enzyme can join two complemetry fraction of nucleic acid and repair single strand breaks.
- That arise in double stranded DNA during replication.
- Example of ligases enzymes:
- Glutamine synthetase and
- Glutathione synthetase

The Mechanism of enzyme action



LOCK AND KEY HYPOTHESIS

- Enzymes are very specific and it was suggested by Fischer in 1890 that this was because the enzyme had a particular shape into which the substrate or substrates fit exactly.This is often referred as Lock and Key hypothesis.

Lock and Key model:

- According to this model, shape of active site of enzyme is complementary to the shape of substrate molecules. Ie . the substrate is like a key whose shape is complementary to the enzyme which is supposed to be lock and they fit perfectly.

THANK YOU