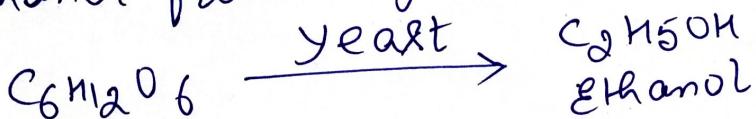


Department Of Microbiology  
B.T. College, Patna - I  
B.Sc. Part I "IMB" "Enzyme"  
By Deepak K. Ratan

The term enzyme was coined by F.W. Kuhne in 1878.

in 1878.  
It is originated from Greek word "En-zyme"  
which means in yeast, as it was first  
observed in ~~the~~ fermentation process in yeast.

which helps in fermentation.  
It was observed during the production of ethanol from sugar.



# Glucose

- ⇒ Enzyme act as biocatalyst.
- "Enzyme is a bio catalyst which enhances the rate of chemical reaction without taking part in it.
- ⇒ The branch of biology which deals with the study of enzyme is called Enzymology.
- ⇒ The study of enzyme started in late 1700s. when an attempt is made for digestion of meat by gastric juice.
- ⇒ In the mid of nineteenth century it was "Louis Pasteur" who made a conclusion about conversion of sugar into alcohol by yeast cell by the process of fermentation.

## Properties of Enzymes :-

- ⇒ Enzyme are biocatalyst which increases/enhances the rate of chemical reaction
- ⇒ Enzymes are mostly proteinous in nature.
- ⇒ Enzymes are powerful catalysts
- ⇒ Enzymes are substrate specific.
- ⇒ Enzymes transform energy.

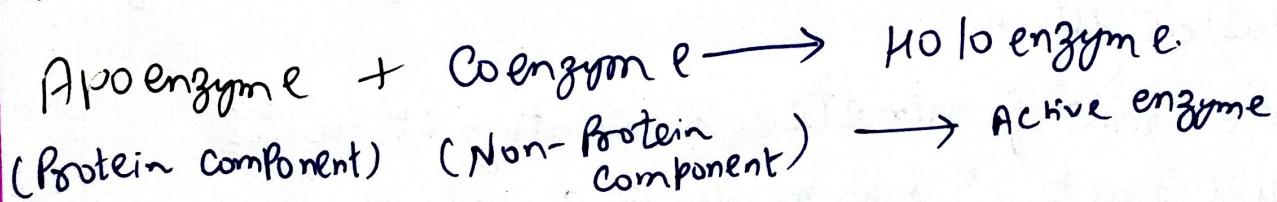
## Enzymes are mostly protein

The protein enzyme may function directly without the assistance of any other chemical group or sometime binds with some other chemical group called co-factor which is either ion such as Fe, Mg, Mn, Zn, Cu, K etc.

⇒ Some non-protein group bound to the enzyme called prosthetic group which is either metal ion or co-enzyme or co-factors.

⇒ Holoenzyme :- The proteinous enzyme bind together with some metals (Fe, Mg, Mn, Zn, Cu, K) are formed as Holoenzyme.

⇒ The protein part associated with that enzyme is known as Apoenzyme



Enzymes are highly specific

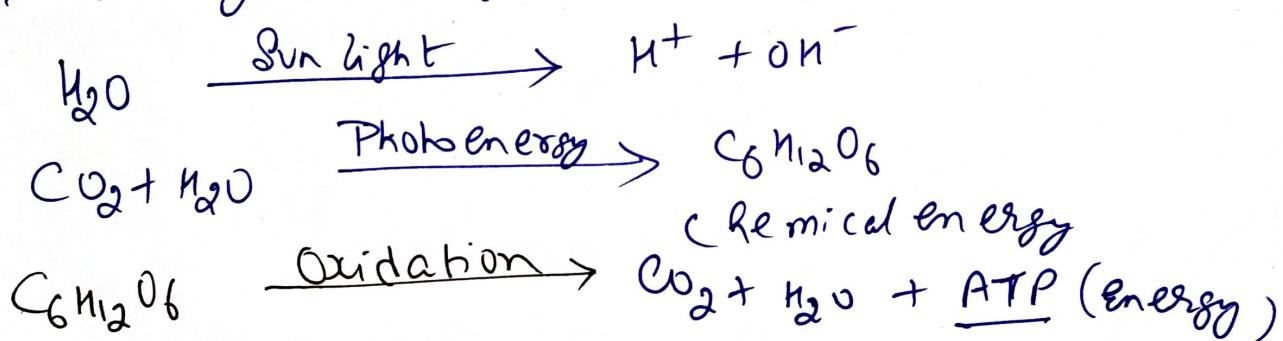
Enzymes are highly specific means enzyme are substrate specific

Maltose	<u>Maltase</u>	$\rightarrow$ Glucose + Glucose
Lactose	<u>Lactase</u>	$\rightarrow$ Galactose + glucose
Sucrose	<u>Sucrase</u>	$\rightarrow$ Fructose + glucose
Lipid	<u>Lipase</u>	$\rightarrow$ Fatty acid + glycerol
Protein	<u>Pepsin</u>	$\rightarrow$ Peptide + Peptone
Peptide	<u>Pepsin</u>	$\rightarrow$ Amino acid

Enzymes transform energy:

Enzyme are capable of transformation of substrate to liberate Energy.

e.g. During photo lytic (Process of Photo synthesis)



Change of substrate from one form to another form.

Classification of enzymes:

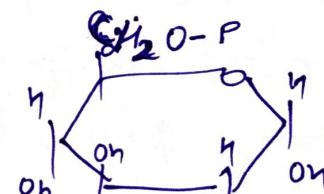
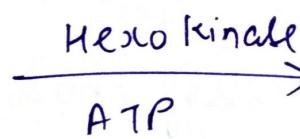
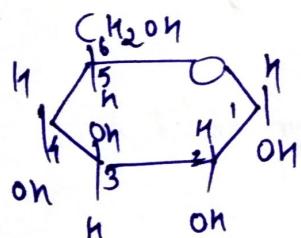
On the basis of the function enzyme are further classified into six sub type by EC (Enzyme Commission).

Oxido-reductase (3) Hydrolase (5) Isomerase  
 Transferase (4) Lyase (6) Ligase.

Oxido-reductase: - The enzyme which performs the process of oxidation and reduction is termed as Oxido-reductase.  
 ⇒ The addition of oxygen is termed as oxidation  
 ⇒ The removal of hydrogen atom is termed as reduction.

eS:- Dehydrogenase.

Transferase: - ~~The~~ Enzyme used for transfer of functional groups either as transfer of atoms i.e. by donating the ion or accepting the ion present in substrate. Addition of Phosphate group.



Glucose-6-phosphate

Hydrolase :- These enzymes break the hydrolytic bond / Covalent bond situated in the molecule.

C-O; C-N; C-C.

eS:- Glycosidase, esterase.

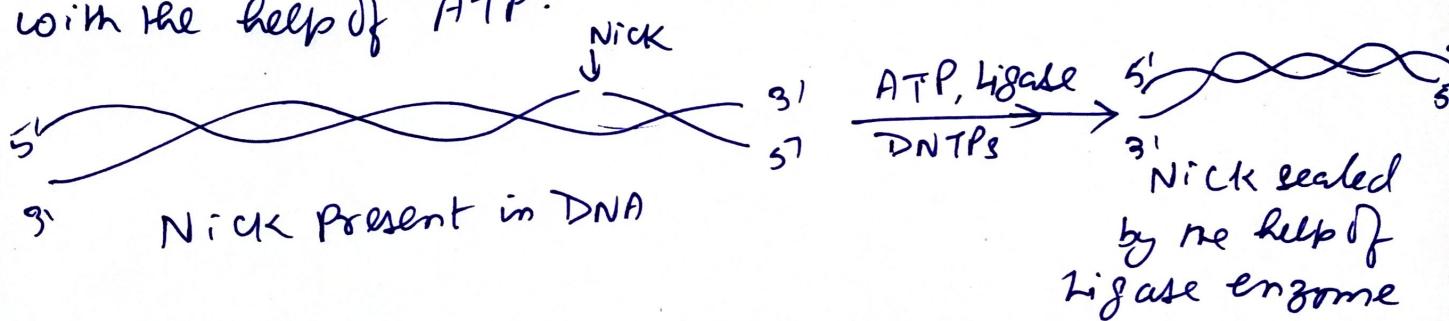
Lyase :- These enzymes catalyze cleavage C-C; C-O; C-N

PUMAglate  $\xrightarrow{\text{fumarate}}$  Malate

5. Isomerase: The enzyme responsible for conversion of substrate from one form to another form



6. Ligase: The enzyme responsible of joining the two molecules with the help of ATP.



Enzyme is a substrate specific and binds with substrate

