ENZYMES

→ Single cell contain 2000 - 3000 enzymes
→ Enzymes have globular shape
→ Coenzymes are NADP, FAD and NAD
→ Strongest coenzyme is NAD
→ The bond b·w enzyme and coenzyme is a weak bond
→ Holoenzyme : Enzyme + Coenzyme
→ Apoenzyme : Enzyme without its coenzyme
→ Inorganic compound attached to enzyme is called prosthetic group
→ If prosthetic group is any metal e·g Fe^{+2}, Mg^{+2}, K^{+}, it is called metal activator
→ The bond b·w enzyme and prosthetic group is strong
→ Taq polymerase is the temperature insensitive enzyme.
→ Taq polymerase is extracted from Thermus Aquaticus
→ Cofactors : → Prosthetic Group (Non-protein such as metallic ion)
→ Coenzymes (small organic molecules)
→ The non-protein organic molecule which are bonded to the protein part of the enzyme is known as prosthetic group
→ The non-protein inorganic substance which act as a cofactor is known as activator
→ The protein digesting enzyme which works best in alkaline condition is trypsin (pH = 7·8 - 8·7)
→ pH for ureas and catalase = 7

3.3 COFACTORS

Cofactors - are atoms, groups of atoms and molecules that join with enzymes altering their shape and making them functional. One can think of these cofactors as an" on-off" switch for activating an enzyme. '

If the cofactor is a non-protein like a metallic ion (i.e. zinc, copper, or iron) it is referred to as a prosthetic group.

Some cofactors are small organic molecules called coenzymes. Like enzymes they are not permanently altered in the reactions.

Many of these coenzymes are derived from vitamins and minerals that are essential for life. The absence of these cofactors can lead to vitamin and mineral deficiency diseases e.g lack of Vitamin B produces beriberi . Examples of coenzymes are NAD+, FAD+, NADP.

3.4 Enzyme nomenclature

Many enzymes but not all end in the suffix "ase". (exceptions: pepsin, trypsin). They are named for the substrate they act on or the action they perform.

The following are the six major enzyme categories.

1. Oxidoreductases

These enzymes catalyze various types of oxidation-reduction reactions. Subclasses of this group contain oxidases, oxygenases and peroxidases.

2. Transferases

These enzymes catalyze reactions that involve the transfer of groups from one molecule to another. Examples of such groups include amino, carboxyl, methyl and carbonyl.

Transcarboxylases and transmethylases are

Table 3.1 Enzyme Nomenclature by Substrate

Substrate	Enzyme
Lipid	Lipase
Urea	Urease
Maltose	Maltase
Ribonucleic Acid (RNA)	RNAase
A TP	ATPase
Dextrose	Dextrase
Protein	Proteinase

examples of transferases.

3. Hydrolases These enzymes catalyze hydrolytic reactions

These enzymes catalyze the reactions in which the cleavage of bonds is accomplished by the addition of water. The hydro lases include the esterases, phosphatases and peptidases.

4. Lyases

Lyases catalyze reactions in which groups (e.g H_2O, CO_2 and NH_3) are removed form a double bond or added to a double bond .Decarboxylases, deaminases and synthases are examples of Lyases.

5. Isomerases These enzymes catalyze isomerization reactions i-e catalyze intermolecular rearrangement of atoms.

This is a heterogeneous group of enzymes which catalyze several types of intermolecular rearrangements. Epimerases and mutases are the examples.

6. Ligases (also called Synthases)

Ligases catalyze bond formation between two substrate molecules. The energy for these reactions is always supplied by ATP hydrolysis. e.g DNA ligases, RNA ligases

For your information

Enyzme	pH Optimum
Lipase (Pancreas)	8.0
Lipase (Stomach)	4.0-5.0
Lipase (Castor oil)	4.7
Pepsin (Stomach)	1.5-1.6
Trypsin (Small Intestine)	7.8-8.7
Urease	7.0
Invertase	4.5
Maltase	6.1-6.8
Amylase (Pancreas)	6.7-7.0
Amylase (malt)	4.6-5.2
Catalase	7.0