

Physico-Chemical Nature of Enzyme DPI (11)

Dr. Indu Kumari
Dept. of Botany

Enzymes are proteinaceous molecules acting as biological catalyst. They are of proteinous nature, which accelerates the rate of biochemical reactions but do not affect the nature of final product.

Physical properties of enzymes:

Physico-Chemical Nature — most of the enzymes are made up of two portions, an apoenzyme and a coenzyme or prosthetic group.

Apoenzyme + Coenzyme (prosthetic group) = ~~holoenzyme~~
= holoenzyme

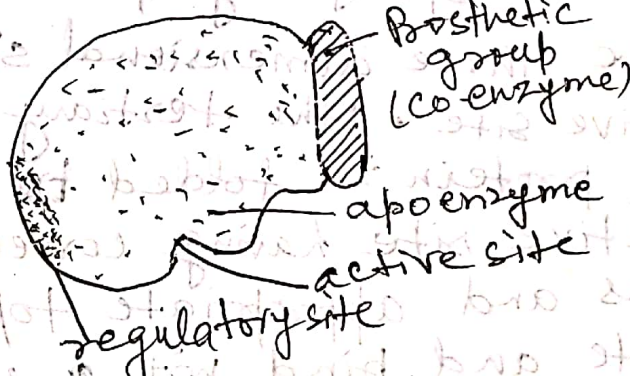


Fig: Morphology of an enzyme (diagrammatic)

Both enzymes remain inactive when separated from each other. Specificity of an enzyme is due to its apoenzyme portion. The coenzymes are non specific. It can participate in several types of enzymatic reactions.

Chemical analysis have shown that apo-enzyme is a protein, composed of α -amino acid units. All enzymes are proteins, but all proteins are not enzyme. They show colour reactions and ultraviolet spectrum, characteristic of protein. Heat, acid, alkali or other agents which denaturates proteins also destroy enzymatic activity.

Some enzymes show absolute specificity for the substrate. Other have broader specificity and may accept several different analogs of a specific substrate. For example glucokinase is specific for glucose only. On the other hand, hexokinase catalyses the phosphorylation of glucose, mannose, fructose, glucosamine and 2-deoxyglucose, although not at the same rate.

The specificity of enzyme is due to its definite three dimensional structure and to its active site. The tertiary structure of the enzymic protein is folded to create a region called active site having correct molecular dimensions and appropriate topology to accomodate and bind with a specific substrate. It is made up of few amino acids and are flexible in their structural organization, so that it can accomodate substrate molecules.

In some enzymes an additional site, called regulatory site is also present, where regulatory molecules may bind to activate or deactivate enzyme.

(3)

Enzymes exist either as single unit (monomeric) or aggregate of several subunits (oligomeric). They have an active ~~center~~ center where substrate molecules bind during enzymic reaction. Both enzymes are different in their kinetic behaviour.

The apoenzyme behaves as true catalyst during enzymic reaction. It takes part in reaction, accelerate the rate of reaction. After reaction is completed, it always returns back to its original form.

The coenzyme may change after reaction and another reaction is required to revert it back.

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