

## **ENZYMES**

**Enzyme**, a substance that acts as a catalyst in living organisms, regulating the rate at which chemical reactions proceed without itself being altered in the process.

The biological processes that occur within all living organisms are chemical reactions, and most are regulated by enzymes. Without enzymes, many of these reactions would not take place at a perceptible rate. Enzymes catalyze all aspects of cell metabolism. This includes the digestion of food, in which large nutrient molecules (such as proteins, carbohydrates, and fats) are broken down into smaller molecules; the conservation and transformation of chemical energy; and the construction of cellular macromolecules from smaller precursors. Many inherited human diseases, such as albinism and phenylketonuria, result from a deficiency of a particular enzyme.

*(The catalyst in living cells which facilitate the metabolic reactions are called enzymes. the miracle of life is that chemical reactions in the cell occur with great accuracy and at astonishing speed. without proper enzymes to process the food we eat , it might take us years to digest our breakfast or lunch.)*

With the exceptions of some RNAs that have catalytic activity, all enzymes are proteins or their derivatives and vary in molecular weight from 10,000 to 5,00,000. of all the functions of proteins, catalysis probably the most important. in the absence of catalysis most reactions in biological systems would take place too slowly to provide products at an educate speed for metabolising organisms. a number of enzymes have been isolated and obtained in a crystalline form. other enzymes are derivatives of proteins formed by combination with some other groups such as metal. enzymes containing a wide range of metals including iron, copper, zinc manganese and magnesium are known. in other cases the proteins is combined with non-proteinous organic molecule they come under Co factors.

### **Nomenclature and classification of enzymes.**

The first enzymes to be discovered were named according to their source or mode of activity. the enzyme pepsin is present in digestive juices of stomach derived from Greek word pepsis means digestion. the first active enzyme were those present in the yeast Zymase (originated from the Greek word zyme ) are found in yeast. They catalyse the fermentation of glucose to ethyl alcohol and carbon dioxide. many other enzymes have been given uninformative names example trypsin, chymotrypsin (present in pancreatic juice ).Papain is present in papaya.

However above nomenclature has not always been practical. as the number of newly discovered enzymes are increasing rapidly a more systematic nomenclature has been developed.

according to new system of nomenclature, enzymes are divided into 6 major classes, which are further divided into subclasses according to the type of reaction catalysed.

each enzyme is assigned a recommended name, usually short and appropriate for everyday use, a systematic name which identifies that reaction catalyses and a classification number. the classification number is used for accurate identification of enzymes required. the coding system is mainly used by research workers.

### **A. Systematic names**

the systematic names of the enzyme consist of 2 parts. the first part contains the name of the substrate while the second part indicates the nature of the reaction and it uses *-ase* as the suffix. for example alcohol dehydrogenase in which alcohol is the substrate and it is oxidised by the enzyme however in case of bimolecular reaction the first part contains the name of the both substrate separated by a colon for example for the bimolecular reaction.

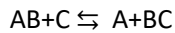


the systematic name for the enzyme is ATP: creatine phosphotransferase. The enzyme catalysed the transfer of phosphate group from ATP to creatine. the recommended name of the enzyme that is normally used is creatine kinase. although systematic names are quite logical but they are inconvenient to use.

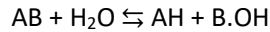
### **B. Major classes of enzymes**

1. Oxido-reductase: they catalyse oxidation reduction reactions. Transfer of electrons takes place from one molecule to another.

2. Transferease: transferase catalyses the transfer of functional group from one substrate to another.

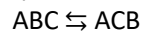


3. Hydrolase: they catalyses hydrolytic reactions, in which a substrate is hydrolysed into 2 simpler products. during hydrolysis hydrogen atoms form water enter one of the products while hydroxyl groups end up in the other product. The reaction is



4. Lyases: they catalyse the reactions involving removal of a group leaving a double bond or addition of a group to a double bond. decarboxylase which regulates the release of carbon dioxide from respiratory substance are examples of lyase enzyme. Deaminases catalyse the release of ammonia from amino acids.

5. Isomerases: Isomerases control the conversion of one isomer of a compound to another of the same compound,



The interconversion of sugar isomers in glycolysis catalysed by isomerases enzymes example glucose-6-phosphate is converted to fructose-6-phosphate buy hexosephosphate isomerase.

6. Ligases: this group of enzymes catalyse reactions in which new chemical bonds are formed. ATP provides the energy to make new chemical bonds. for example DNA and RNA Ligase control the synthesis of macromolecules su