

Enzymes: Notes for UPSC Exam

Enzymes are proteins made from amino acids. It is made up of hundreds and thousands of amino acids stringed together in a very specific and unique order. Any chemical reaction inside a cell or any work that goes on inside a cell is the handiwork of enzymes inside the cell. The word enzyme was coined in 1878 by German Scientist Wilhelm Kuhne.

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How do Enzymes function?

Enzymes act as biological catalysts (biocatalysts). Catalysts accelerate chemical reactions. The molecules upon which enzymes may act are called substrates, and the enzyme converts the substrates into different molecules known as products. Almost all metabolic processes in the cell need enzyme catalysis in order to occur at rates fast enough to sustain life. Metabolic pathways depend upon enzymes to catalyze individual steps.

Like all catalysts, enzymes increase the reaction rate by lowering its activation energy. Some enzymes can make their conversion of substrate to product occur many millions of times faster. An extreme example is orotidine 5'-phosphate decarboxylase, which allows a reaction that would otherwise take millions of years to occur in milliseconds.

What are the Different Types of Enzymes?

On the basis of work done at the molecular level enzymes are classified into 6 different types which are given below.

1. Hydrolases - They break chemical bonds when water is added. There are more than 200 types of hydrolases.
2. Oxidoreductases - They are involved in catalyzing oxidation and reduction reactions.
3. Transferases - Involved in transfer of functional groups from donor molecule to acceptor molecule.
4. Isomerases - There are 4 different sub-categories under this. They bring about structural changes within the molecule.
5. Ligases - An example is DNA ligase which catalyzes ligation or repair of breaks in DNA.
6. Lyases - They are also called synthase enzymes.

What are the 5 Examples of Digestive Enzymes?

The different types of digestive enzymes are given below.

1. Amylase - helps in breaking down large starch molecules, this enzyme is produced in the mouth.
2. Pepsin - helps in breaking down proteins, this is produced in the stomach.
3. Trypsin - helps in breaking down proteins, this is produced in the pancreas.
4. Pancreatic lipase - helps in breaking down fats, once again this enzyme is produced in the pancreas.
5. Ribonuclease and deoxyribonuclease - helps in breaking down DNA and RNA, this enzyme is also produced in Pancreas.

How Many Enzymes are found in Human Cells?

There are approximately 1300 different enzymes found in human cells.