

Enzyme Encyclopedia Article

Enzyme

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Enzyme

Enzymes are catalysts, compounds (a protein) that speed up the rate at which chemical reactions occur within living organisms without undergoing any permanent change themselves. They are crucial to life since, without them, the vast majority of biochemical reactions would occur too slowly for organisms to survive.

In general, enzymes catalyze two quite different kinds of reactions. The first type of reaction includes those by which simple compounds are combined with each other to make new tissue from which plants and animals are made. For example, the most common enzyme in **nature** is probably carboxydismutase, the enzyme in green plants that couples **carbon dioxide** with an acceptor molecule in one step of the **photosynthesis** process by which carbohydrates are produced.

Enzymes also catalyze reactions by which more complex compounds are broken down to provide the energy needed by organisms. The principal digestive enzyme in the human mouth, for example, is ptyalin (also known as an amylase), which begins the digestion of starch.

Enzymes have both beneficial and harmful effects in the **environment**. On the one hand, environmental hazards such as **heavy metals**, pesticides, and radiation often exert their effects on an organism by disabling one or more of its critical enzymes. As an example, **arsenic** is poisonous to animals because it forms a compound with the enzyme glutathione. The enzyme is disabled and prevented from carrying out its normal function, the maintenance of healthy red blood cells.

On the other hand, uses are now being found for enzymes in cleaning up the environment. For example, the Novo Nordisk company has discovered that adding an enzyme known as Pulpzyme® can vastly reduce the amount of **chlorine** needed to bleach wood pulp in the manufacture of paper. Since chlorine is a serious environmental contaminant, this technique may represent a significant improvement on present pulp and paper manufacturing techniques.