

Enzymes

An enzyme is a catalytic protein molecule which speeds up specific biological reactions.

All enzymes are **proteins** and have all the properties of a protein.

Denaturation is the loss of the 3 dimensional shape of a protein and its functions due to a change in the environment. This can be either reversible or irreversible.

Enzymes have 4 common features:

1. They **make reactions faster**. The reaction can still occur without the enzyme but it would take too long.
2. Like most catalysts, enzymes are not used up or permanently altered during a reaction. **They can be reused**.
3. Enzymes can **catalyse forward and backward reactions**.
4. Enzymes are **very specific and selective**. They work on specific molecules (selective substrate: the molecule which undergoes the reaction)

The region where the substrate fits to undergo the reaction is called the **active site**. It is the most important part of the enzyme.

The **lock and key mechanism (hypothesis)** tells us that the **substrate** must fit perfectly in the **active site of the enzyme**. When the substrate has fit in the enzyme it is called an **enzyme-substrate complex**.

Enzymes lower the **activation energy** (energy needed for a reaction to take place) thus making the reaction faster. This is done when the substrate is in the active site. It gives an optimal environment for the substrate to be broken down or built up by straining its bonds. After the reaction, a new product is formed which doesn't fit in the active site and leaves the enzyme which remains unchanged.

Enzymes don't work at the same rate; some are faster than others.

Ex: Catalase can deal with millions of substrate per minute.

Enzyme concentration affects the rate of reaction. If there is a constant supply of substrate and an increase in enzyme concentration, the rate of the reaction would keep increasing. In reality this doesn't happen as all the substrates would have been reacted and an increase in enzyme concentration wouldn't affect the rate of reaction.

4 factors which influence enzyme activity are:

1. Concentration of substrate
2. Temperature
3. pH (alkaline or acidity)
4. Inhibitors (compounds which interfere negatively with enzyme activity)