

Enzymes

Definition and Role:

- **Catalyst:** A substance that speeds up chemical reactions without being changed.
- **Enzyme:** A biological catalyst essential for processes like respiration. Enzymes are necessary for life by speeding up vital reactions.

Enzyme Specificity:

- **Substrate:** The substance that an enzyme acts upon.
- Enzymes are highly specific due to their **active site**, which has a unique shape that fits only one specific substrate. When the enzyme and substrate bind, they form an **enzyme-substrate complex**. After the reaction, the products leave the enzyme.

Factors Affecting Enzyme Activity:

- Temperature:
 - Enzymes have an **optimum temperature**, usually around 37°C for human enzymes.
 - At low temperatures, enzyme activity is slow because molecules have less energy and move slowly.
 - Higher temperatures increase enzyme activity, but extreme heat (above 50°C) can **denature** enzymes, altering the active site's shape and causing the enzyme to lose function.

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- pH:
 - Enzymes also have an **optimum pH**, which varies for different enzymes.
 - For example, **pepsin** (found in the stomach) works best at pH 2, while **amylase** (in saliva) works best at pH 7.
 - Extreme pH levels (too high or too low) can denature enzymes by disrupting their structure.

- **Key Concept:** Denaturation occurs when an enzyme's active site changes shape due to non-optimal temperature or pH, causing a loss of enzyme function.



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