

# Impact of Temperature on Enzyme Activity

Esha Makhdoom

December 2025

## 1 Introduction

Enzymes are biological catalysts that speed up biochemical reactions.

Temperature plays a crucial role in determining enzyme activity. At low temperatures, enzyme activity increases steadily. Once the *optimum temperature* is reached, enzyme activity peaks. Beyond this temperature, enzymes begin to denature, resulting in a decrease in activity.[2]

## 2 Theory

Enzyme reaction rate is often modeled using the Michaelis-Menten equation:

$$V = \frac{V_{\max}[S]}{K_m + [S]}$$

Temperature affects both  $V_{\max}$  and  $K_m$ . A moderate increase in temperature enhances kinetic energy, but excessive heat breaks down the enzyme structure [1]

## 3 Inserting a Picture

Below is an example image of an enzyme-substrate complex:

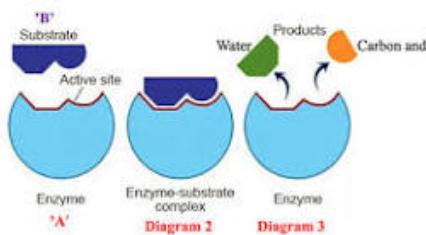


Figure 1: Enzyme Substrate

## 4 Conclusion

Temperature significantly influences enzyme activity. Enzymes work best at an optimal temperature; too low slows reactions, too high denatures the enzyme. Understanding this relationship is essential in biology, medicine, and biotechnology.

## 5 Equation

The Quadratic formula is  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  | |

## References

- [1] Michelle E Peterson, Roy M Daniel, Michael J Danson, and Robert Eisenthal. The dependence of enzyme activity on temperature: determination and validation of parameters. *Biochemical Journal*, 402(2):331–337, 2007.
- [2] Alisa S Wolberg, Zhi Hong Meng, Dougald M Monroe III, and Maureane Hoffman. A systematic evaluation of the effect of temperature on coagulation enzyme activity and platelet function. *Journal of Trauma and Acute Care Surgery*, 56(6):1221–1228, 2004.