

Biophysics of enzyme stabilization

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“Presented at the Postgraduate Biophysical Seminars, Spring 99 (2020)”

Abstract

Introduction: An important feature of proteins, especially enzymes, is their stability. Structural stability is directly related to the quantity and quality of the molecules' performance. when the enzymes are in their natural tissue, they have a specific stability that determines their half-life but when extracted from natural tissues, their stability has changed and often declines. Therefore, one of the challenges that is always faced by bio-scientists is to increase the stability of these macromolecules when working with them in vitro or when immobilizing them on unnatural substrates. In this article, we attempt to present studies about the factors that influence the stability of enzymes and novel methods for their stabilization after immobilization.

Methods: UV-vis, fluorescence, circular dichroism (CD) and FT-IR Spectroscopy. Transmission Electron Microscope, gel electrophoresis, solubility and osmometry, Molecular Dynamics. The enzymatic kinetics with the Michaelis-Menten or Lineweaver-Burk equations have also been investigated.

Results and discussion: If extraction or immobilization decreases enzyme stability and activity, some conditions or compounds are designed for the enzyme to improve this stability.

Conclusion: By performing structural studies on enzymes and predicting their orientation by computational methods, prior to the laboratory test, conditions can be designed for the enzymatic test and stabilization process that not only decrease their efficiency but also increase the activity of the enzyme by stabilizing it.

Keywords: enzyme, immobilization, stabilization

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