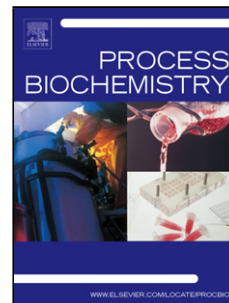


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Biotransformation of Carbamazepine by Laccase-Mediator System: Kinetics, By-products and Toxicity Assessment

Mitra Naghdi¹, Mehrdad Taheran¹, Satinder K. Brar^{*1}, Azadeh Kermanshahi-pour², M. Verma³ and R. Y. Surampalli⁴

¹INRS-ETE, Université du Québec, 490, Rue de la Couronne, Québec G1K 9A9, Canada,

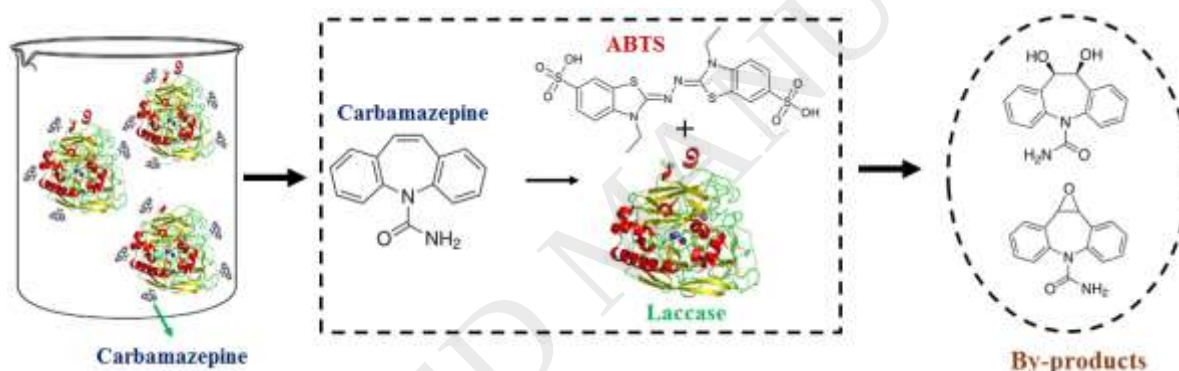
²Biorefining and Remediation Laboratory, Department of Process Engineering and Applied Science, Dalhousie University, 1360 Barrington Street, Halifax, Nova Scotia, Canada, B3J 1Z1

³CO₂ Solutions Inc., 2300, rue Jean-Perrin, Québec, and Québec G2C 1T9, Canada

⁴Department of Civil Engineering, University of Nebraska-Lincoln, N104 SEC PO Box 886105, Lincoln, NE 68588-6105, USA

(*Phone: 1 418 654 3116; Fax: 1 418 654 2600; E-mail: satinder.brar@ete.inrs.ca)

Graphical Abstract



Research Highlights:

- Temperature and pH affected the removal of carbamazepine with the laccase-ABTS system.
- Maximum degradation efficiency of carbamazepine with laccase-ABTS was up to 95%.
- Laccase cannot reach more than 32% degradation efficiency in the absence of ABTS.
-

Abstract

Carbamazepine (CBZ) is one of the most detected pharmaceutical compounds around the world, with adverse human and animal health impacts in wastewater effluents. Recently, biocatalytic degradation using ligninolytic enzymes such as laccase along with redox mediators provides a promising approach for their removal from water and wastewater. However, the effects of operational parameters on biotransformation need to be investigated in order to design a robust and efficient process. In this research, central composite design was performed and analyzed using response surface methodology to study the effects of temperature, pH, enzyme concentration and mediator concentration. The adequacy of the developed model was confirmed by the coefficient of multiple regression ($R^2=75.97\%$) indicating a reasonable model for practical implementation. The results showed that performing the

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