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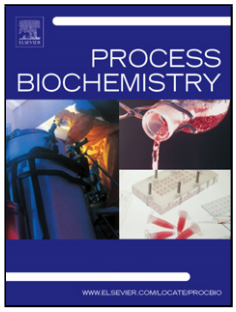

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Biotransformation of Carbamazepine by Laccase-Mediator System: Kinetics, By-products and Toxicity Assessment

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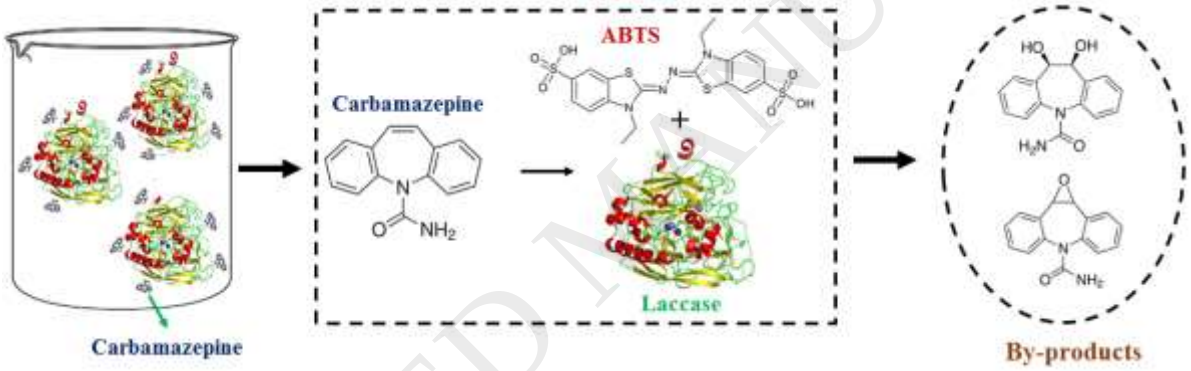
Graphical Abstract



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.
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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