Development of bioreactor systems for decolorization of Reactive Green 19 using white rot fungus

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Received 27 May 2014; Accepted 15 January 2015

\textbf{ABSTRACT}

The ability of \textit{Trametes versicolor} U97 to decolorize Reactive Green 19 in bioreactor was investigated to determine whether the immobilized enzyme would be suitable for decolorization of Reactive Green 19 under agitation and nonagitation condition. Free cells of \textit{T. versicolor} U97 showed an ability to decolorize Reactive Green 19 by approximately 44\% in 72 h. Mediator mixture containing Tween 80, MnSO\textsubscript{4}–H\textsubscript{2}O\textsubscript{2}, and hydroxybenzotriazole was added to the immobilized fungi to improve the decolorization process. Reactive Green 19 was decolorized by the immobilized fungi by approximately 80\%, which is a twofold improvement over decolorization without mediators. In bioreactor system, decolorization of Reactive Green 19 was increased to 82\% after 72 h. We evaluated the efficiency of the decolorization model for use in a small industry. Our results indicated that the wastewater discharge of 10 m\textsuperscript{3} d\textsuperscript{−1} requires a reactor volume of 24 m\textsuperscript{3} to obtain 80\% decolorization with a retention time of 1.75 d. This study identified that bioreactor of \textit{T. versicolor} U97 immobilization is the most promising method for use in decolorize Reactive Green 19 and may be suitable for the treatment of wastewater in small industries.

\textbf{Keywords:} Reactive Green 19; Decolorization; \textit{Trametes versicolor}; Immobilized fungi; Immobilized enzymes; Bioreactor; Design large scale

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