



Continuous decomposition of Acid Blue 74 in a membrane reactor with soluble laccase

Marcin Lewańczuk, Jolanta Bryjak*, Marek Bryjak

Faculty of Chemistry, Wrocław University of Technology, Norwida 4/6, 50-373 Wrocław, Poland,

emails: marcin.lewanczuk@pwr.edu.pl (M. Lewańczuk), jolanta.bryjak@pwr.edu.pl (J. Bryjak), marek.bryjak@pwr.edu.pl (M. Bryjak)

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ABSTRACT

The discussed investigation is focused on decolorization of Acid Blue 74 (AB74) carried out in enzymatic membrane reactor (EMR) at presence of laccase from *Cerrena unicolor*. A range of assumptions were held for EMR, that is: (i) total amount of laccase present in feed was rejected by membrane and remained in EMR; (ii) the enzyme was sufficiently stable; (iii) substrate and by-products of its decomposition were not adsorbed on membrane; and (iv) additional aeration was not required. Modeling of the process was made using selected kinetic equation, parameters of which were firstly evaluated and next applied to process planning protocol and experimental verification. The residence time of ca. 9 min and 70% substrate conversion at pH 5.3 were assumed, while actual results showed conversion of 70.2% for $\tau = 9.36$ min (calculated: 70% and 9.2 min). It allowed to conclude that AB74 decolorization process performed at constant concentration of laccase in a given volume of EMR could be fully predictable. In the long-term process, the enzyme inactivation was noted, but still it was four times lower than the one obtained in the fed-batch reactor. However, in the EMR system, the activity level could be easily refreshed.

Keywords: Membrane reactor; Laccase; Continuous process; Dye decolorization

* Corresponding author.

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