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An evaluation of decolorization mechanism of synthetic dyes belonging to the azo, anthraquinone, and triphenylmethane group, as a sustainable approach, by immobilized *CB8* strain (*Trametes versicolor*)

Ruchi Upadhyay[a,*], Hafiz Ihsan Ul-Haq Khan[b], Wioletta Przystaś[a]

[a]*Department of Air Protection, Faculty of Energy and Environmental Engineering, Silesian University of Technology, Konarskiego 22B, 44-100 Gliwice, Poland, Tel.: +48-739412091; email: Ruchi.Manishkumar.Upadhyay@polsl.pl ORCID: 0000-0002-6372-4992 (R. Upadhyay), Wioletta.Przystas@polsl.pl ORCID: 0000-0002-7403-2043 (W. Przystaś)*
[b]*Laboratory of Industrial Water and Ecotechnology (LIWET), Department of Green Chemistry and Technology, Faculty of Bioscience Engineering, Ghent University, Campus Kortrijk, Sint-Martens-Latemlaan 2B, B-8500 Kortrijk, Belgium, email: Hafiz.Khan@UGent.be*

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ABSTRACT

The accumulation of different kinds of synthetic dyes in the environment poses a global ecological threat. White rot fungi play an important role in dye decolorization, but there is a scope for developing improvised dye decolorization methods and analysing its mechanism. In the present study, we used free and immobilized biomass (on two solid synthetic supports) of the *Trametes versicolor* (*CB8*) strain to decolorize five of the most utilized synthetic dyes belonging to three different classes, namely triphenylmethane (Brilliant Green, Crystal Violet), azo (Congo Red, Evans Blue), and anthraquinone (Remazol Brilliant Blue R) in a wide range of initial concentration (100, 200, 300 and 400 mg·L^{-1}). The best removal (more than 90%) was observed for three dyes (Evans Blue, Remazol Brilliant Blue R, Crystal Violet) in case of free and immobilized biomass at all concentrations whereas immobilization did not prove beneficial for elimination of Congo Red. The UV-Vis spectrum analysis proved the dye decolorization was performed by biodegradation method. Through the desorption study, the individual participation of physical sorption in the decolorization of dye was investigated. It was concluded that biochemical decolorization played a major role in dye decolorization. Further research is indicated to optimize the degradation process by immobilized *CB8* strain.

Keywords: Decolorization; Azo dye; Anthraquinone dye; Triphenylmethane dye; Biosorption; *Trametes versicolor* (*CB8*)

* Corresponding author.