Discoloration of aqueous textile dyes solution by *Phanerochaete chrysosporium* immobilized in modified PVA matrix

Ani Idris,*, Mohd Suardi Suhaimi, Nor Azimah Mohd Zain, Roslina Rashida, Norasikin Othman

*Department of Bioprocess Engineering, Institute of Bioproduct Development (IBD) Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia
Email: ani@cheme.utm.my

Faculty of Biosciences and Bioengineering, Department of Industrial Biotechnology, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia

Faculty of Chemical Engineering, Department of Chemical Engineering, Institute of Bioproduct Development (IBD) Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia

Received 16 February 2012; Accepted 3 June 2013

**ABSTRACT**

This study investigates the performance of immobilized *Phanerochaete chrysosporium* in modified PVA matrix in removing a mixture of textile dyes consisting of Yellow FG, Red 3BS, Orange 3R, Blue RSP, Black B, and remazol turquoise blue from aqueous solution. The effects of agitation and temperature were thoroughly investigated in determining the optimum operating condition of dye discoloration using central composite design. Optimum condition was determined as 100 rpm and 35°C. Evidently, adsorption only plays a minor role in removing these dyes as it contributes to about 8% of color removal. The rest of color removal could be attributed to fungal enzymatic biodegradation, particularly the highly regarded manganese peroxidase. Manganese peroxidase assay revealed that a maximum enzyme activity of 174 U/l was achieved in the third cycle of repeated use. The reusability test also revealed that the immobilized fungus could be used for up to six cycles with a peak of 82% of discoloration, where discoloration started to fluctuate until the fifth cycle before a sharp decrease in dye discoloration was observed. The incidence of aromatic ring breakage was confirmed by FTIR analysis as indicated by the occurrence of certain corresponding peaks.

**Keywords:** Immobilized *Phanerochaete chrysosporium*; Modified PVA matrix; Dye discoloration; Manganese peroxidase; FTIR