

Decolorization of Brilliant Blue RAN By Laccase

ZHANG Ruiping^{1*} WANG Xiaoyan¹ ZHANG Xiaoli¹

¹School of Textile and Clothing, Nantong University, Jiangsu Province, China

*Corresponding author: ZHANG Ruiping, Email: 13515201941@163.com

Abstract. Acid dyes, such as Brilliant Blue RAN, are extensively used in dyeing protein fabrics. After dyeing, some of the undyed or unfixed dyes are lost in the effluents which causing the environmental pollution. Laccases are multi-copper oxidases that can catalyze the oxidation of a large amount of organic compounds, including phenolic, amine and other kinds of ramification compounds. This paper aims to apply of the laccase on the decolorization of Brilliant Blue RAN. The influences of temperature, time, pH, the dosage of laccase and different additives on decolorization were analyzed. The kinetics of decolorization was determined. The results indicated that the optimum decolorization conditions were temperature 30°C, time 30 min, pH 7, dosage of laccase 0.2g/L. The maximum color removal of laccase was about 98%. Most of the tested metal ions did not inhibit the colour removal of dyestuff, but laccases were highly sensitive to Fe²⁺ and Fe³⁺, the presence of Fe significantly inhibited the enzymatic decolorization. Surfactants including JFC and peregol O have some certain inhibition effect on laccase decolorization. Laccase presented the Michaelis constant (K_m) of 36.08mg/L and the maximum decolorization rate (V_{max}) 10.36mg/(L·min) for the reaction with Brilliant Blue RAN, which suggested laccase had a higher affinity for Brilliant Blue RAN as substrate. The results demonstrated that the use of the laccase has an enormous potential to degrade acid dye Brilliant Blue RAN and this enzyme can be used for treating textile wastewaters, particularly for water recycling.

Keywords: Laccase; Brilliant Blue RAN; decolorization; dyeing wastewater