



Investigation of adsorption behavior of cationic nonwoven textiles as an alternative and environmentally friendly adsorbent to remove the Reactive blue 21 dye from a model solution

Tuğçe Demirel^{a,*}, Yusuf Yavuz^a, Mustafa Erdem Üreyen^b, Ali Savaş Koparal^c

^aEskişehir Technical University, Department of Environmental Engineering, Eskişehir, Turkey, Tel. 0090 222 321 35 50; emails: tdemirel@eskisehir.edu.tr (T. Demirel), yuyavuz@eskisehir.edu.tr (Y. Yavuz)

^bEskişehir Technical University, Department of Fashion Design, Eskişehir, Turkey, email: meureyen@eskisehir.edu.tr (M.E. Üreyen)

^cHealth Programs Department, Open Education Faculty, Anadolu University, Yunus Emre Campus, 26470, Eskişehir, Turkey, email: askopara@anadolu.edu.tr (A.S. Koparal)

Received 16 June 2021; Accepted 26 September 2021

ABSTRACT

This study investigates the usability of cheap, easy-to-use and environmentally-friendly cationic nonwoven textiles as an alternative to the current adsorbents for the removal of dyestuffs from the colored wastewater generated by both industrial and domestic use. The parameters impacting the adsorption were analyzed to determine the efficacy of nonwoven textiles, and it was found that 99.47% of the dye could be removed under optimal conditions. The fit with Langmuir isotherm models of the Reactive blue 21 dye's adsorption onto a cationic nonwoven textile was analyzed, along with its adsorption kinetics and thermodynamics fitting the second-order rate model. The desorption studies performed for the dye adsorbed nonwoven textile at 50°C and 100°C were shown that the product was suitable for industrial use. This study puts forward an economic solution to environmental issues related to color removal through a product whose efficiency has been determined, and which we believe with contributing to a sustainable environment.

Keywords: Adsorption; Cationic nonwoven textile; Color fastness; Dyestuff; Wastewater treatment

* Corresponding author.