Desalination and Water Treatment
www.deswater.com

doi: 10.1080/19443994.2015.1029002

57 (2016) 9286–9295
April

Taylor & Francis
Taylor & Francis Group

Ultrasonic-assisted adsorption of methylene blue on sumac leaves

Jale Gülen[a,*], Bora Akın[b], Mahmure Özgür[c]

[a]*Chemical Engineering Department, Yıldız Technical University, 34210 Esenler – Istanbul, Turkey, email: gulenj@yildiz.edu.tr*
[b]*Chemical Engineering Department, Çankırı Karatekin University, 18200 Çankırı, Turkey, email: mboraakin@gmail.com*
[c]*Chemistry Department, Yıldız Technical University, 34210 Esenler – Istanbul, Turkey, email: mozgur@yildiz.edu.tr*

Received 13 February 2014; Accepted 8 March 2015

ABSTRACT

Sumac leaves (SL) (*Rhus coriaria* L.) were investigated as a low-cost and effective bioadsorbent for the adsorption of methylene blue (MB) from aqueous solution. In this study, the effects of initial dye concentration, initial solution pH, and phases contact time were investigated. The equilibrium was attained in half an hour. The Langmuir, Freundlich, and Temkin adsorption models were evaluated using the experimental data and the experimental results showed that the Langmuir and Temkin models fit better than the Freundlich model. The maximum dye adsorption capacity was found as 5.8 mg/g from the Langmuir isotherm model. The value of the monolayer saturation capacity of SL was comparable to the adsorption capacities of some other adsorbent materials for MB. The adsorption rate data were analyzed according to the pseudo-first-order kinetic model, pseudo-second-order kinetic model, and intraparticle diffusion model. It was found that the adsorption reaction progressed as a pseudo-second-order kinetic model and intraparticle diffusion was also effective in the process.

Keywords: Adsorption; Biosorbent; Isotherms; Kinetics; Methylene blue; Sumac leaves; Langmuir; Freundlich; Temkin; Ultrasonic-assisted

*Corresponding author.

1944-3994/1944-3986 © 2015 Balaban Desalination Publications. All rights reserved.