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Removal of textile dyes by sorption on low-cost sorbents. A case study: sorption of reactive dyes onto *Luffa cylindrica*

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ABSTRACT

The sorption of reactive dyes Red Procion HE-7B (RP) and Yellow Procion H-4R (YP) on raw *Luffa cylindrica* was examined. Characterization of the sorbent was made by its infrared analysis and also by SEM analysis. The effect of a number of experimental parameters such as sorbent amount, contact time, pH of the dye solution, dye concentration and temperature was evaluated by using the batch technique. The best pH conditions for sorption and desorption are 2.5 and 12. The sorption followed the Langmuir isotherm model, and increasing temperature resulted in increased sorption capacity. Kinetic studies were also carried out and specific rate constants were calculated. Dye sorption experimental data were well fitted to the pseudo second-order kinetic model, and the intraparticle diffusion was also significant. The sorption capacity — 12.2 and 13.9 mg/g for YP and RP, respectively, at 22°C — indicated that this sorbent can be effective for reactive dyes removal. Fixed bed column experiments were also performed and breakthrough curves were obtained. Cycles of sorption/desorption showed a distinct behavior for the dyes; the desorption efficiency of YP increased, achieving 97–98% in the 3rd cycle.

Keywords: Sorption; *Luffa cylindrica*; Reactive dye; Pseudo-second order kinetics; Intraparticle diffusion; Langmuir isotherm model

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