

Fixed bed adsorption study for removing of reactive orange 16 and acid red 114 dyes from aqueous solution using Kenaf

ABSTRACT

Kenaf fiber has proved its ability to remove dyes from aqueous solutions. This natural material is characterized by its abundant, relatively low cost and eco-friendly. In this study, kenaf core fiber was modified by adding trimethyl-chloro-bilateral-hydroxypropyl trimethyl ammonium chloride as a quaternizing agent to the constituent in order to increase its ability to adsorb dyes more efficiently. In fixed bed column model, Adsorption experiment was carried out to investigate the effect of height, initial dye concentration, flow rate, and regeneration. Maximum bed capacity, percentage dye removal and equilibrium dye uptake were determined and breakthrough curves were plotted. It was observed that adsorption was higher at lower flow rate, higher bed depth and lower initial dye concentration for two dyes. Maximum bed capacity of 3.25 g was obtained at a flow rate of 10 ml/min, bed height of 7.5 cm and initial dye concentration of 100 ppm. Data from column studies were fitted to three well established column models, Thomas model, Adams-Bohart model and Yoon-Nelson model. The experimental data were in good agreement with theoretical results. The study revealed the applicability of kenaf in fixed bed column for removal of dyes.

Keyword: Acid red114; Reactive orange16; Modified kenaf center fiber; Adsorption