

Removal of reactive orange 16 dye from aqueous solution by using modified kenaf core fiber

ABSTRACT

Evaluated removal of reactive orange 16 (RO16) dye from aqueous solution was studied in batch mode by using kenaf core fiber as low-cost adsorbents. In this attempt, kenaf core fiber with size 0.25-1 mm was treated by using (3-chloro-2-hydroxypropyl) trimethylammonium chloride (CHMAC) as quaternization agent. Then effective parameters include adsorbent dose, pH, and contact time and initial dye concentration on adsorption by modified kenaf core fiber was investigated. In addition, isotherms and kinetics adsorption studies were estimated for determination of the equilibrium adsorption capacity and reactions dynamics, respectively. Results showed that the best dose of MKCF was 0.1 g/100 mL, the maximum removal of RO16 was 97.25 at 30°C, pH=6.5, and agitation speed was 150 rpm. The results also showed that the equilibrium data were represented by Freundlich isotherm with correlation coefficients $R^2=0.9924$, and the kinetic study followed the pseudo-second-order kinetic model with correlation coefficients $R^2=0.9997$ for $C_0=100$ mg/L. Furthermore, the maximum adsorption capacity was 416.86 mg/g. Adsorption through kenaf was found to be very effective for the removal of the RO16 dye.

Keyword: Reactive orange; Aqueous solution; Modified kenaf core fiber