

Adsorption and mechanism study for methyl orange dye by cross-linked chitosan-ethylene glycol diglycidyl ether beads

Ali H. Jawad*

Faculty of Applied Sciences, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia, emails: ahjm72@gmail.com/
ali288@salam.uitm.edu.my

Received 10 November 2018; Accepted 7 June 2019

ABSTRACT

In this study, cross-linked chitosan-ethylene glycol diglycidyl ether beads (Chi-EGDEB) were prepared to be potential adsorbent for methyl orange (MO) dye removal from aqueous solution. Adsorption experiments were performed as a function of contact time (0–240 min), initial dye concentration (50–200 mg/L), and pH (3–10). The adsorption data of MO on the cross-linked Chi-EGDEB were in agreement with Langmuir and Freundlich isotherms. The adsorption capacity of the cross-linked Chi-EGDEB for MO was 112.4 mg/g at 303 K. The kinetic data were well described by pseudo-second-order kinetic model. The adsorption process was spontaneous and endothermic in nature. The mechanism of adsorption included mainly hydrogen bonding interaction, electrostatic attractions, and n - π stacking interaction. This study reveals that the cross-linked Chi-EGDEB as a good candidate for removal of acid dye from aqueous solution.

Keywords: Chitosan beads; Ethylene glycol diglycidyl ether; Cross-linking; Adsorption; Methyl Orange

* Corresponding author.