



Removal of azo dye from aqueous solution by host–guest interaction with β -cyclodextrin

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ABSTRACT

Water pollution is a serious threat to the human beings' survival and development and a universal problem across community society. In this work, a novel β -cyclodextrin (β -CD) hydrogel was successfully synthesized by polycondensation reaction using epichlorohydrin (EPI) and β -CD under basic condition, and the swelling ratio at room temperature was up to 181%. The adsorption behavior and adsorption mechanism of EPI crosslinked β -CD were evaluated by using acid orange 7 (AO7) as a model dye. We found that the adsorption process obeyed the pseudo-second-order kinetic model, and the maximum adsorption capacity of AO7 was estimated to be 132 mg g⁻¹, which is much higher than the bamboo charcoal, titanium dioxide and so on. Moreover, intraparticle diffusion model indicates that the adsorption process can be divided into three stages: diffusion of the AO7 to β -CD hydrogel surface, intraparticle diffusion, establishment of the adsorption equilibrium, and the host–guest interaction between the hydrophobic naphthyl group and the cavity of β -CD plays the decisive role in the adsorption of AO7 onto β -CD hydrogel.

Keywords: Absorption; β -CD hydrogel; Azo dyes; Kinetics; Isotherms

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