



Adsorption of methyl orange from aqueous solution using chitosan microspheres modified by β -cyclodextrin

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ABSTRACT

Chitosan microspheres modified by β -cyclodextrin (CDS) were prepared and utilized for removing methyl orange (MO) from aqueous media in this study. Batch experiments were conducted to examine kinetics, adsorption isotherm, pH effect, and thermodynamic parameters. Adsorption data of MO uptake by CDS were analyzed according to Langmuir and Freundlich adsorption models. Thermodynamic parameters for the adsorption system were determined at 303, 313, 323 and 333 K ($\Delta H^\circ = -26.02 \text{ kJ mol}^{-1}$; $\Delta G^\circ = -8.66$ to $-6.95 \text{ kJ mol}^{-1}$ and $\Delta S^\circ = -57.28 \text{ J K}^{-1} \text{ mol}^{-1}$). ΔG° values obtained were negative, indicating that the adsorption of MO on the surface of CDS was a spontaneous adsorption process. The kinetics of this process was described very well by a pseudo-second-order rate equation. These results showed that the CDS could be considered as a potential adsorbent for the removal of MO in aqueous solution.

Keywords: Methyl orange; Chitosan microspheres; β -cyclodextrin; Adsorption; Kinetics; Thermodynamics

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