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REMOVAL OF AQUEOUS Cu(II) WITH NATURAL KAOLIN: KINETICS AND EQUILIBRIUM STUDIES

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Abstract

Copper pollution is common across the world and has caused serious public health problems recently. Among the conventional methods, adsorption has proved effective, economic, versatile and simple for the removal of aqueous Cu(II) contaminants. Deposits of natural Kaolin are abundant around the world, and are regarded as valueless due to its limited usage in industry. In this study, the adsorption behavior of natural Kaolin towards Cu(II) was evaluated. According to the results, the isothermal adsorption data are well fitted with Sips model, and the adsorption capacity of natural Kaolin to Cu(II) is determined to be 76 mg/g. Several factors can affect the adsorption performance of Cu(II), including dosage of adsorbent, initial Cu(II) concentration, solution pH, temperature and contact time. The kinetics data are also well predicted by the pseudo-first order kinetics and the pseudo-second order kinetics; the equation of the intraparticle diffusion model could be considered as a supplement. The thermodynamic behavior reveals the endothermic and spontaneous nature of the adsorption. The mechanism for the adsorption behavior was studied based on XRD spectra, and ion-exchange reaction and surface complexation were regarded as predominant.

Key words: adsorption, complexation, Cu(II), ion-exchange reaction, natural Kaolin

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