Adsorption kinetics of phenol in aqueous solution onto activated carbon from wheat straw lignin

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ABSTRACT

Activated carbon produced from wheat straw lignin using chemical activation with phosphoric acid acts as an activator at 873 K. Porous structure of activated carbon was characterized by scanning electron microscopy and nitrogen adsorption. The BET surface area of activated carbon is 1,123 m\textsuperscript{2}/g, the total pore volume is 0.43 cm\textsuperscript{3}/g, and the nominal pore size is 0.12 nm. Experiments were performed to investigate the adsorption kinetics of phenol in aqueous solution onto activated carbon. Four models (the pseudo-first-order model of Lagergren, the pseudo-second-order model of Lagergren, Elovich equation, and the intraparticle diffusion model) were used in this study. The results showed that the adsorption processes were perfectly fitted to the pseudo-second-order model with very high regression coefficients. The application of the intraparticle diffusion model indicated that the adsorption mechanism of phenol in aqueous solution was rather a complex process. The rate was controlled not only by intraparticle diffusion but also some other mechanisms.

Keywords: Adsorption kinetic; Phenol; Activated carbon; Wheat straw lignin

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