

Sorption of humic acid to layered double hydroxides prepared through ion thermal method

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ABSTRACT

Ultrathin layered double hydroxides (LDHs) with small particle size were synthesized using a deep eutectic solvent (I-LDH) and were applied for humic acid removal. The characteristics of I-LDH and its calcinated product (I-CLDH) were analyzed via SEM, TEM, FTIR, XRD, AFM, and BET. The morphologies of I-LDH and I-CLDH were similar. The mean particle size was around 10–40 nm and formed a monolayer of around 0.7 nm. The removal of humic acid followed pseudo-first-order kinetics, and the sorption capacity was improved via calcination. Based on the Langmuir sorption isotherm, the sorption capacity of I-CLDH reached 43.11 mg/g. The results of measuring the samples after sorption (via XRD, SEM, and FTIR) suggested that the sorption of humic acid onto LDHs occurred by intercalation and surface sorption. In addition, the pH value had a slight effect on sorption performance, and the coexisting anions in the environment (especially carbonates) had an inhibitory effect on the sorption.

Keywords: Humic acid; Ionothermal synthesis; LDH; Sorption

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