



Mesoporous treated sewage sludge as outstanding low-cost adsorbent for cadmium removal

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ABSTRACT

Low-cost adsorbent based on sewage sludge was studied on the adsorption of cadmium ion (Cd(II)) in a batch system. The raw sewage sludge was treated using sulfuric acid and then heated at 300°C. The as-obtained material was characterized by thermogravimetric analyses, Fourier transform infrared spectroscopy, scanning electron microscopy and Brunauer–Emmett–Teller surface area. The treated sewage sludge (TSS) exhibits a higher surface area than the raw material due to the activation process. Some parameters such as adsorbent dose, solution pH, initial concentration and contact time were investigated in the batch system to study the optimum adsorption condition of the adsorbent. The kinetic study showed that the adsorption is well described by the pseudo-second-order kinetic model, while sorption isotherms gave better fit for the Langmuir model yielding an adsorption capacity of 56.2 mg/g. Moreover, adsorption mechanism was proposed on the basis of infrared spectroscopy and elemental analyses after adsorption.

Keywords: Adsorption; Heavy metals; Cadmium ions; Mesoporous; Sewage sludge

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