



Batch kinetics and isotherms for biosorption of cadmium onto biosolids

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Received 1 February 2009; Accepted 1 July 2010

ABSTRACT

A basic investigation into the removal of cadmium ions from aqueous solutions by municipal-wastewater biosolids was conducted in batch conditions. The influences of different experimental parameters such as initial pH, shaking rate, sorption time, equilibrium conditions and initial cadmium-ion concentrations on cadmium uptake were evaluated. According to our experimental results, a pseudo-second-order model was more suitable for describing the biosorption kinetics than the Lagergren model. Kinetic experiments showed that cadmium concentrations reached equilibrium within 2h. We found that the biosorptive capacity of the biosolids was dependent on solution pH, with pH 4 being optimal. Investigation of the influence of the shaking rate on the biosorption capacity of the biomass showed that an optimum value was obtained between 150 and 250 rpm. The Langmuir isotherm model better represented the sorption process than the Freundlich model. The maximum cadmium adsorption capacity of the biosolids (q_{\max}) was 0.38 mm/g dry biosolid and the Langmuir constant (k_d) was 0.1044 mm/l.

Keywords: Biosorption; Cadmium; Biosolids; Kinetics; Isotherm

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