



Multielement adsorption of metal ions using Tururi fibers (*Manicaria Saccifera*): experiments, mathematical modeling and numerical simulation

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ABSTRACT

A numerical and experimental study of the multielement adsorption of Cd²⁺, Cu²⁺, Ni²⁺, and Pb²⁺ metal ions in batch and column system were carried out in aqueous solution using Tururi fibers as adsorbent. The kinetics and thermodynamic equilibrium parameters were studied. The adsorption kinetics was fitted to the homogeneous diffusion model and the results showed good linear correlation coefficients. Furthermore, a mathematical model was built to describe the mass transfer kinetics for fixed bed column tests. The effects of constant adsorption equilibrium, external mass transfer, and intraparticle diffusion resistance on breakthrough curves were studied. The equations which describe the phenomenology were discretized using the finite volumes method with the weight upstream differencing scheme and central difference scheme formulations. The results for the breakthrough curves obtained through simulation showed good agreement compared with the experimental data.

Keywords: Adsorption; Metal ions; Tururi fibers; Mathematical modeling

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