



Sorption of malachite green by eucalyptus bark as a non-conventional low-cost biosorbent

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ABSTRACT

In this work, eucalyptus bark, a forest waste, was evaluated for its ability to remove malachite green (MG) from aqueous solutions. Sorption kinetic experiments were studied in a batch mode operation at various initial dye concentrations, sorbent dosages, and temperatures. The equilibrium sorption data of MG by eucalyptus bark were analyzed by Langmuir and Freundlich isotherm models. The results indicate that both the Langmuir and Freundlich equations provide good correlation of the experimental data, but the Langmuir expression fits the equilibrium data better. The maximum sorption capacity of eucalyptus bark was found to be 59.88 mg g⁻¹ at 20°C. Pseudo-first-order, pseudo-second-order, and intraparticle diffusion models were used to analyze the kinetic data obtained at different concentrations. Among the kinetic models studied, the pseudo-second-order was the best applicable model to describe the sorption of MG by eucalyptus bark. The overall rate of dye uptake was found to be controlled by external mass transfer at the beginning of sorption, while intraparticle diffusion controlled the overall rate of sorption at a later stage. The results indicate the potential of eucalyptus bark as biosorbent for the removal of basic dye from aqueous solution.

Keywords: Malachite green; Eucalyptus bark; Batch mode; Sorption kinetics; Sorption isotherm

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