

Evaluation of *Ocotea puberula* bark powder (OPBP) as an effective adsorbent to uptake crystal violet from colored effluents: alternative kinetic approaches

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Abstract

The *Ocotea puberula* bark powder (OPBP) was evaluated as an effective adsorbent for the removal of crystal violet (CV) from colored effluents. OPBP was characterized and presented a surface with large cavities, organized as a honeycomb. The main functional groups of OPBP were O-H, N-H, C=O, and C-O-C. The adsorption of CV on OPBP was favorable at pH 9 with a dosage of 0.75 g L⁻¹. The Avrami model was the most suitable to represent the adsorption kinetic profile, being the estimated equilibrium concentration value of 3.37 mg L⁻¹ for an initial concentration of 50 mg L⁻¹ (CV removal of 93.3%). The equilibrium was reached within 90 min. The data were better described by the Langmuir isotherm, reaching a maximum adsorption capacity of 444.34 mg g⁻¹ at 328 K. The Gibbs free energy ranged from - 26.3554 to - 27.8055 kJ mol⁻¹, and the enthalpy variation was - 11.1519 kJ mol⁻¹. The external mass transfer was the rate-limiting step, with Biot numbers ranging from 0.0011 to 0.25. Lastly, OPBP application for the treatment of two different simulated effluents was effective, achieving a removal percentage of 90%.

Keywords

Adsorption; Biot number; Crystal violet; Mass transfer parameters; *Ocotea puberula*