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ASSESSMENT OF KINETICS, EQUILIBRIUM AND THERMODYNAMICS OF BLACK KROM KJR DYE ADSORPTION ONTO AQUATIC MACROPHYTE *Pistia stratiote*

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Abstract

The macrophyte *Pistia stratiote* was used as biosorbent for the removal of Black Krom KJR (BK-KJR) dye in synthetic aqueous solution. Initially, some tests were performed to verify the best operational conditions such as pH, biosorbent particle size, sorption temperature and stirring speed, which were later used in the kinetic and equilibrium tests. All tests were performed in duplicate. The highest removal rates of the pollutant were achieved at the process conditions of initial pH 2, granulometric mixture of roots, 30 °C and stirring speed of 80 rpm. In the kinetic test an equilibrium time of 24 h was found. The kinetic data were adjusted by applying the pseudo-first order, pseudo-second order and Elovich models, and as a result the best fit was found with the pseudo-second order model. In the equilibrium study it was found that, among the tested models, Langmuir model was the one that best fitted the experimental data, with a maximum sorption capacity (q_{max}) of $84.11 \pm 1.64 \text{ mg g}^{-1}$ and affinity constant (b) $0.025 \pm 0.001 \text{ mg L}^{-1}$. These results showed high potential of the macrophyte *Pistia* sp. as an alternative material to remove the BK-KJR dye.

Keywords: biosorption, dye, macrophyte, modeling, *Pistia stratiote*, thermodynamic parameters

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