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"Gheorghe Asachi" Technical University of Iasi, Romania

BIOSORPTION OF Cr(VI) FROM AQUEOUS SOLUTIONS ONTO *Hydrilla verticillata* WEED: EQUILIBRIUM, KINETICS AND THERMODYNAMIC STUDIES

Santhi Raju Pilli, Vaibhav V. Goud, Kaustubha Mohanty*

Indian Institute of Technology Guwahati, Department of Chemical Engineering, Guwahati - 781039, Assam, India

Abstract

This work reports the ability of nonliving *Hydrilla verticillata*, an aquatic macrophyte to remove Cr(VI) from it's aqueous solutions. The biosorbent was characterized by finding the bulk density, BET surface area, porosity and pore volume. SEM combined with EDX was used to study the surface morphology of the biosorbent. FTIR spectrum analysis of the native and Cr(VI) loaded biosorbent revealed that O–H, N–H and C–O groups were the leading Cr(VI) binding groups. The efficiency of Cr(VI) removal was studied as a function of contact time, initial Cr(VI) concentration, pH, biosorbent dose, temperature and agitation speed. It was found that the initial pH of the solution greatly affected the Cr(VI) sorption efficiency. Optimum biosorption conditions were found to be pH 1.0, 0.1 g L−1 biosorbent dosage, 200 rpm agitation speed and 200 min equilibrium time. An increase in temperature, increased the removal of Cr(VI) which indicated that the biosorption process was endothermic in nature. The biosorption kinetics followed the pseudo-second-order model closely and intra-particle diffusion was found to be the rate-controlling mechanism. The fitness of biosorption equilibrium data for Langmuir and Freundlich isotherm models were tested and it was found that the biosorption system was more likely monolayer coverage of *H. verticillata* biomass by the chromium ions.

Key words: biosorption, chromium, kinetics, thermodynamics, weed

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* Author to whom all correspondence should be addressed: e-mail: kmohanty@iitg.ernet.in , mohanty_k_iit@yahoo.com, Tel.: +91 361 2582267, Fax: +91 361 2582291