Biosorption of Cr$^{6+}$ from aqueous solution by sugarcane bagasse

Inés de la C. Alomá$^a$, I. Rodríguez$^a$, M. Calero$^{b,*}$, G. Blázquez$^b$

$^a$Department of Chemical Engineering, Central University “Marta Abreu” of Las Villas, Carretera a Camajuaní km 5 [1/2], Santa Clara, Villa Clara, Cuba

$^b$Department of Chemical Engineering, University of Granada, 18071 Granada, Spain

Tel. +34 958 243311; Fax: +34 958 248992; email: mcaleroh@ugr.es

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**ABSTRACT**

The biosorption characteristics of Cr$^{6+}$ from aqueous solution using sugarcane bagasse (SCB) were investigated. Experimental parameters affecting the biosorption process, such as pH, contact time, initial metal concentration, and temperature were studied. The equilibrium nature of Cr$^{6+}$ biosorption at different temperatures was described by the Freundlich, Langmuir, Sips, and Dubinin–Radushkevich isotherms. The biosorption isotherm of SCB for Cr$^{6+}$ followed the Langmuir model, and the maximum biosorption capacity of Cr$^{6+}$ obtained was 1.76 mg/g at 25$^\circ$C. The biosorption kinetics of Cr$^{6+}$ onto SCB followed the pseudo-second-order model. The calculated thermodynamic parameters ($\Delta G$, $\Delta H$, and $\Delta S$) showed that the biosorption of Cr$^{6+}$ ions were feasible, spontaneous ($\Delta G = -21.52$ kJ·mol$^{-1}$), and exothermic ($\Delta H = -6.364$ kJ·mol$^{-1}$) at the temperature range of 25–65$^\circ$C.

**Keywords:** Sugarcane bagasse; Biosorption; Heavy metals; Equilibrium isotherm; Kinetic