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BIOSORPTION OF TRIVALENT CHROMIUM FROM AQUEOUS SOLUTIONS BY *Pleurotus ostreatus* BIOMASS

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Abstract

Trivalent chromium [Cr(III)] is a pollutant commonly found in wastewater emanating from leather tanning, dye, wood preservation, and electroplating industries. Long-term exposure to high Cr(III) concentrations may cause allergic skin reactions, cancer and DNA damage. Therefore, the removal of Cr(III) is nowadays recognized as a key process for the detoxification of Cr(III)-contaminated water and wastewater. Biosorption of heavy metals by biomaterials has emerged as a sustainable strategy for the detoxification of wastewaters, as it is effective, cheap and eco-friendly.

The main aim of this work was to study the effect of relevant environmental parameters such as solution pH, initial Cr(III) concentration, contact time, and temperature on the ability of *Pleurotus ostreatus* biomass to biosorb Cr(III) ions from aqueous solutions. Furthermore, the kinetics, isotherm and thermodynamics of Cr(III) biosorption by *P. ostreatus* are described. In addition, the functional groups on the surface of *P. ostreatus* involved in Cr(III) biosorption were identified by diffuse reflectance infrared Fourier transform spectroscopy (DRIFTS).

It was found that the optimum pH for Cr(III) biosorption was 5.5. The pseudo first-order model best fitted to the experimental data of Cr(III) biosorption. Of the ten isotherm models tested, the Langmuir model best described the Cr(III) biosorption equilibrium process. According to this model, the maximum Cr(III) biosorption capacity of *P. ostreatus* is 108 mg g^{-1}. Thermodynamic parameters (activation energy, and changes in activation enthropy, activation enthalpy, and free energy of activation) revealed that the biosorption of Cr(III) onto *P. ostreatus* is an endothermic and non-spontaneous process. DRIFTS studies suggest that the main functional groups involved in Cr(III) biosorption by *P. ostreatus* are the following: C-H, OH, NH_3^+, C=O y CHO.

Results indicate that *P. ostreatus* is one of the best biosorbents for Cr(III) removal from aqueous solutions hitherto reported and could therefore be effectively used to detoxify wastewaters polluted with Cr(III).