Removal of chromium from contaminated liquid effluents using natural brushite obtained from bovine bone

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ABSTRACT

Natural brushite (nDCPD) obtained from bovine bone was used to remove Cr(III) from aqueous solutions. Cr(III) adsorption was performed, varying adsorbent concentration and contact time in solution. The kinetic study of Cr(III) adsorption was performed with the kinetic models of pseudo-first order and pseudo-second order, Elovich, intraparticle and external diffusions. The experimental data were examined with the Langmuir, Freundlich, Redlich–Peterson (R–P), SIPS and Temkin isothermal models. The surface of the adsorbent was characterized by various techniques. The results show that most of the kinetic adsorption data were well described by the pseudo-first-order model, the equilibrium data were best fitted to the SIPS and Langmuir models, with adsorption capacity of 43.378 and 50.767 mg/g, respectively. The equilibrium time of the system was set at 10 h. A 95% Cr(III) removal rate was achieved. The calculated thermodynamic parameters show that Cr(III) adsorption is carried out spontaneously on the surface of nDCPD, although it is positively charged, indicating that nDCPD can be a low cost and easy to obtain effective adsorbent for the removal of Cr(III) from aqueous solutions.

Keywords: Bio-adsorption; Efficiency; Kinetics; Wastewaters; Cr(III); Brushite

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