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ORNAMENTAL ROCK SOLID WASTE: A LOW-COST SORBENT FOR ARSENIC(V) AND MANGANESE(II)

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Abstract

The capability of ornamental rocks solid waste (ORSW) as a low-cost sorbent was investigated in order to remove As(V) and Mn(II) from aqueous solution. Physical-chemical characterization analyses of the raw material presented albite and quartz as the main minerals. The solid waste presents low surface area (209.70 m^2/g). The Langmuir, Freundlich, Sips (Langmuir-Freundlich), Redlich-Petersen and Tóth models were used to analyze sorption phenomena. The maximum sorption capability from the elements onto ORSW was 1.998 mg/g and 0.635 mg/g for Mn and As, respectively. The results showed that the sorption follows kinetic of pseudo second-order in a diffusion process of two steps, where film and intraparticle diffusion are the mass transport mechanisms. The cationic exchange was also investigated with Mg^{+2}, Na^+ and K^+. However, the migration of these cations to solution, at high As(V) initial concentrations was probably a result of negative charge excess in the surface of ORSW. Under the studied conditions, the results showed that ORSW is a potential and low-cost material for As(V) and Mn(II) removal from aqueous solutions. The As(V) and Mn(II) competitive sorption tests revealed that Mn(II) is preferentially sorbed when compared to As(V).

Key words: arsenic sorption, manganese sorption, solid waste, waste reuse

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