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Characterization of comercial zeolite and its application in adsorption of Mn2+ and Zn2+ in aqueous solution

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The pollution of water resources by metallic ions is an environmental problem that deserves attention. In this context, treatment methods that promote the removal of these contaminants from the aqueous environment have been developed. Adsorption is a promising alternative for the decontamination of effluents containing, and zeolites in turn have demonstrated good performance in this role [1]. Therefore, the present work aimed to use commercial zeolite to apply in the adsorption of Mn2+ and Zn2+ ions. The zeolite was characterized by XRD, FTIR, SEM-FEG, N2 physisorption and zeta potential. By XRD, the presence of high crystallinity was verified, corresponding to the LTA type zeolite crystal structure. By FTIR, the presence of asymmetric stretching bands of Si-O bonds (Si) and Si-O bonds (Al) was verified, corresponding to connection bridges in TO4 tetrahedra belonging to aluminosilicates with a zeolite structure. Furthermore, the material has a micrometric scale and cubic morphology, with particle s with 5µm, surface area of 0.90 m2/g and zeta potential of - 45 mV. The kinetic study of adsorption of Mn2+ and Zn2+ ions was carried out. For this, the concentration of zeolite particles was established at 1 g·L-1, and Mn2+ and Zn2+ ions at 10 mg·L-1. The contact time between the particles and the solutions was fixed in 1, 3, 5, 10, 20, 30, 45, 60 min. The suspensions were shaken and, after the determined time, they were centrifuged. The supernatants were analyzed by atomic absorption spectrometry. The results show that the equilibrium time occurred right at the beginning of the process, in 1 minute. The maximum percentage of adsorption was 69% for Mn2+ and 92% for Zn2+. The kinetic model adjusted corresponding at pseudo-second order model, which indicates that the control of the speed mechanism is chemisorption [2].
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[2] Ho et al. Separ. Purif. Methods. 29 (2), p. 189 (2000)