Sorption Reversibility of Cadmium from Aqueous Solutions on Natural Firoozkoh Zeolite

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Abstract

Removal of boron from aqueous environments (soil and water) is difficult, because it is present as $B(OH)_3$ and $B(OH)_4^-$ species. This research was done to study the sorption of boron by HDTMA-modified zeolite. The sorption of B on modified zeolite was studied as a function of pH (B concentration: 1 and 10 mg L^{-1}) in the range of 6-9.5, and as a function of ionic strength (0.03 and 0.06 M $Ca(NO_3)_2$ or $Mg(NO_3)_2$) at a constant B concentration of 5 mg L^{-1}. Sorption isotherm was performed for the solutions containing initial B concentration in the range of 1-15 mg L^{-1} using a 24h batch equilibration experiment. The results revealed that surfactant-modified zeolite exhibited the best performance at pH 9.5, and sorption of B increased with the increase of suspension pH. Greater B adsorption in the Ca system over the Mg system was clearly observed for the modified zeolite. Sorption isotherm of B were well described by the Freundlich and Langmuir models but the Freundlich sorption model described the interaction between B and the mineral material better than the Langmuir model. Maximum sorption capacity (q_{max}) of the sorbent was 120 mmol kg^{-1}. The experimental data showed that HDTMA-modified zeolite used in this study had a reasonable sorption capacity for B.

Keywords: Boron, Sorption isotherm, Modified zeolite, Removal.

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