Surface complexation model for Zn adsorption on goethite in 0.1–0.7 M NaCl solution

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To date few surface complexation models (SCMs) are available for predicting metal adsorption on mineral surfaces in saline environments. We developed an SCM for zinc (Zn) adsorption on goethite in NaCl solutions with ionic strengths 0.1–0.7 M. We measured adsorption of Zn (5 ppm and 50 ppm) on goethite in 0.1, 0.3 and 0.7 M NaCl solutions at pH 3–10 in batch experiments. A constant capacitance SCM accounting for Zn mono-dentate and bi-dentate surface complexes, the formation of Zn-Cl complexes and Cl adsorption, successfully described the results at all ionic strengths over the full pH range. Our findings suggest that Cl-goethite interactions are important in predicting Zn adsorption on goethite and hence Zn mobility in saline environments.