

Influence of Anatase Content in Sediment and NaCl Concentration in the Leaching Solution in the Leaching of Cd(II) from Artificially Contaminated Sediment

Tasuma Suzuki

Department of Sustainable Environmental Engineering, Graduate School of Sciences and Technology for
Innovation, Yamaguchi University

Summary

The objective of this study was to evaluate the role of anatase impurities in sediments and the NaCl concentrations in the leaching solutions during the Cd(II) leaching from artificially contaminated sediments. It was found that the leaching of Cd(II) increased with increasing NaCl concentrations but this trend was less significant for the sediments containing higher amount of anatase. Based on the modeling analyses considering surface complexation and ion exchange reactions, the observed experimental results were explained as follows by the difference between kaolinite and anatase in the Cd(II) adsorption mechanisms. At pH5.9, which was the pH during the preparation of artificially contaminated sediments, kaolinite absorbs Cd(II) mainly via outer-sphere complex formation and that is why the absorbed Cd(II) was easily desorbed by the Na⁺ containing in the leaching solutions. On the other hand, the dominant Cd(II) adsorption mechanism for anatase was inner-sphere complex formation which was not hindered by the presence of NaCl. These experimental and modeling analyses results consistently showed that the content of anatase in sediments was one of the factors controlling the leaching level of Cd(II) from sediments when exposed to leaching solutions with high NaCl concentration.