The Effect of Ammonia on the Leaching of Cu(II) and Cd(II) from Fly Ash

Jianmin Wang[1], Heng Ban[2], Xinjun Teng[2] and Ken Ladwig[3]

[1]Department of Civil, Architectural & Environmental Engineering, University of Missouri-Rolla, Rolla, MO 65409; [2]School of Engineering, University of Alabama at Birmingham, Birmingham, AL 35294; [3]Electrical Power Research Institute (EPRI), 3412 Hillview Ave., Palo Alto, CA 94304

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ABSTRACT

This paper presents a theoretical model for the adsorption/desorption of cation metals and metal-ammonia complexes on fly ash surfaces based on the experimental results. The effect of ammonia on the adsorption of Cu(II) and Cd(II) by a class F fly ash was investigated using a batch experimental method. Results indicated that high ammonia concentration (> 5000 mg/L) can significantly decrease the adsorption of these metals in the alkaline pH range. Based on theoretical analyses, a mathematical model was developed to quantify the ammonia effect on metal adsorption. The adsorption constants of free metal, metal-hydroxide species, and metal-ammonia complexes for the fly ash were determined by fitting the model to the experimental data. Metal speciation calculation indicated that the formation of less adsorbable metal-ammonia complexes resulted in the decrease of metal adsorption in alkaline pH range and, therefore, increased the metal leaching from fly ash under high ammonia concentrations.

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