Transient Leaching Behavior of Heavy Metals Encapsulated in Fly Ash Solidified/Stabilized Wastes

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ABSTRACT

In this paper, results obtained from the analysis of transient metal leaching behavior of a waste solidified/stabilized using pozzolanic fly ash tested using the toxicity characteristic leaching procedure test under semi-batch conditions during 100 hours of leaching are presented. The metals analyzed were chromium, cadmium, and aluminum. These three metals were present in a simulated waste stream generated by an evaporator during plutonium purification. The transient pH data all exhibited a monotonic increase in pH from an initial value of approximately 3 to an equilibrium value of 10. However, the final equilibrium value was dependent on the aging time.

The transient leachate concentrations of the three metals showed different trends which included samples with a monotonic increase until reach an equilibrium value, samples with an initial peak followed by a decrease to an equilibrium value, samples with an initial peak followed by a decrease to a value below the detection limit, samples with twin peaks followed by a decrease to an equilibrium value, and samples with twin peaks followed by an asymptotic increase to an equilibrium value.

Analysis of the experimental leachate data showed that the solubility behavior of chromium, and aluminum could not be explained by the saturated solubility of their hydroxides. Only cadmium followed the solubility curve for pure hydroxide solutions or for fly ash systems currently reported in the literature.

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