

# **Coal Combustion By-products: Major Cation Solubility**

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## **ABSTRACT**

In a regulatory determination, EPA continued to exempt Coal Combustion By-Products (CCB) from Subtitle C regulation under RCRA. However, due to environmental concerns about the potential release of trace elements to surface and groundwater, EPA has proposed national Subtitle D regulations for CCB placed in landfills and impoundments or used as mine backfill. A column leaching experiment at the U.S. DOE National Energy Technology Laboratory indicates that cation solubility from CCB will be low in these situations. In the leaching study, one kg CCB samples are placed in each of seven columns. Leachants include deionized water, synthetic groundwater, synthetic precipitation, and 0.1 N solutions of acetic acid, sodium carbonate, sulfuric acid, and ferric chloride, surrogates for naturally occurring liquids. The cumulative quantity of each element is calculated as a function of leachate volume (mg/L) and converted to a mass fraction relative to the concentration in the sample (mg/kg). Based on analysis of the release of trace elements from 36 CCB samples indicates that a simple solubility relationship, a function of the concentration in the solid and the volume of the leachant solution, does not adequately describe the observed data. Analysis of the major cation data also indicates that elements such as iron, aluminum, calcium and magnesium in CCB are sparingly soluble. Solubility values for both trace elements and major cations support the conclusion that the solubility of cations from CCB is related to the amount of amorphous material or to differences in mineral composition.