Geochemical modeling of leaching from MSVI air-pollution-control residues

This paper provides an improved understanding of the leaching behavior of waste incineration air-pollution-control (APC) residues in a long-term perspective. Leaching was investigated by a series of batch experiments reflecting leaching conditions after initial washout of highly soluble salts from residues. Leaching experiments were performed at a range of pH-values using carbonated and noncarbonated versions of two APC residues. The leaching data were evaluated by geochemical speciation modeling and discussed with respect to possible solubility control. The leaching of major elements as well as trace elements was generally found to be strongly dependent on pH. As leaching characterization was performed in the absence of high salt levels, the presented results represent long-term leaching after initial washout from a disposal site, that is, liquid-to-solid ratios above 1-2 L/kg. The leaching of Al, Ba, Ca, Cr, Pb, S, Si, V, and Zn was found influenced by solubility control from Al2O3, Al(OH)3, Ba(S,Cr)O4 solid solutions, BaSO4, Ca6Al2(SO4)3(OH)12â26H2O, CaAl2Si4O12â2H2O, Caâ(OH)2, CaSiO3, CaSO4â2H2O, CaZn2(OH)6â2H2O, KAlSi2O6, PbCO3, PbCrO4, Pb2O3, Pb2V2O7, Pb3(VO4)2, ZnO, Zn2SiO4, and ZnSiO3. The presented dataset and modeling results form a thorough contribution to the assessment of long-term leaching behavior of APC residues under a wide range of conditions.