

SUMMARY

Fly ashes from the metallurgical processing of Pb represent the main pollution source of soils in the vicinity of the smelters. The environmental risk is mainly related to the release of inorganic contaminants into the soil system, where they could further migrate and enter into the food chain.

The purpose of this thesis was to determine the leaching behaviour of the metallurgical fly ash in simulators of soil solutions – low-molecular-weight (LMW) organic acids. Batch leaching experiment was performed in the time span of 168 hours, at the solid-to-liquid ratio of 1/10 and in 0.5 mM solutions of organic acids (acetate, oxalate and citrate).

High concentrations of heavy metals were released into the solution during the leaching test (Pb, Cd and Zn). Significantly lower leachabilities were determined for Cu, As and Sb. Whereas the leaching efficiency of acetate and oxalate were rather similar, for citrate the concentrations measured were significantly lower due to higher pH of suspensions. According to the calculations of saturation indices using the PHREEQC-2 program, solutions were oversaturated with respect to anglesite (PbSO_4) and phosgenite ($\text{PbCl}_2 \cdot \text{PbCO}_3$), which tend to precipitate from solutions. As far as acetate and oxalate are concerned, Pb concentrations at the end of experiment are controlled by precipitation of solid Pb acetate and oxalate. This phenomenon can represent a key mechanism of Pb immobilisation in soil systems, in particular in rhizosphere, where the concentration of LMW organic acid is relatively high.