

SUMMARY

In a laboratory pot experiment we investigated a time-dependent release of contaminants from smelter dusts into the soil water and soil. In the experiment we used smelter dusts from two different Cu smelters located in Copperbelt in Zambia (Mufulira and Chambishi). Experimental bags with 0.5 g of dust were placed into pots with 200 g of uncontaminated tropical soil (oxisol) and studied in a time frame of 504 h. Pots were irrigated by deionised water and maintained at the 80 % water holding capacity (WHC). Ten samplings of pore water were performed using the Rhizon pore water samplers. In soil waters, the major released contaminants were Cu, Co and Zn. Concentrations of Cu and Co in soil waters C (from soil with the dust from Chambishi) and M (from soil with the dust from Mufulira) increased during first 48 and 216 h, while concentration of Zn reached highest value in soil waters C and M in 24 and 144 h. This trend has not been observed for Pb, which was released in small amounts and obviously bound to soil constituents. Together with metals, sulfates were highly released into soil waters and affected the speciation of metals (formation of sulfate complexes). Compared to mass loss of the dust from Chambishi with low value (8%), the mass loss of dust from Mufulira after pot experiment were significantly higher (35,6 %), due to the dissolution of major primary phase, chalkantite. Despite higher bulk concentrations of Co, Cu and Zn in dust from Chambishi, the release these contaminants into the soil water was higher for experiment M. This fact indicates that major mechanism influencing the release and subsequent mobility of Co, Cu and Zn from the smelter dust in soils was the pH.