Abstract

Leaching represents an essential concept related to the natural processes that occur at the contact between solids and solutions. The leaching properties of mineral wastes point to the mobility of contained contaminants in various scenarios and, thus, the environmental risk of the wastes. Experimental tools have been developed to determine the leachability over a range of conditions and to be a part of the waste evaluation workflow. Special emphasis is given to the dynamic column leaching tests that approximate percolation occurring in the field and enable to describe the time dependence of leaching. Processes that are observed in full-scale systems may substantially differ from those in the laboratory simulations. Apart from the field experiments and geochemical modelling, also modifying the original leaching test protocols expands our awareness of the mineral waste behaviour. We performed a column leaching test. Secondary Pb metallurgical slag coming from the Pb-scrap recycling was leached according to the standardised column leaching test EN 14405 as a part of broader research on the leachability of slag exposed to the wetting-drying cycles. The cumulative leached mass of both metal and major elements was lower compared to the previous turn; bulk leached masses of the main contaminants related to the sample mass were on average (μg/kg): Ba 6743, Sb 221, Pb 47 and Zn 21. The highest concentrations of most constituents were observed at the beginning of the experiment. The concentration of none of the contaminants exceeded the threshold for hazardous waste; hydrous ferric oxides (HFO), baryte ($BaSO_4$) and cerussite ($PbCO_3$), which were already partially formed during the first part of the experiment are expected to control the release of toxic metal(loid)s. The equilibration of the column before the restart of the second experiment caused higher initial concentrations of constituents whose transport is mostly controlled by diffusion (and can be limited by physical non-equilibrium) compared to the last eluate fractions of the first run of the experiment.