

Environmental and Health Impacts of Hazardous Metals from Sulfidic Mine Tailings

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Mine waste sites that are improperly managed can have detrimental effects on both the environment and human health. These effects are dependent on the solid phase characteristics of the mining waste, and the associated release of potentially toxic elements. In the present study, the tailings of a Zn-Pb deposit in Plombières (Eastern Belgium), were investigated. To assess the risks posed to environmental and human health, leaching tests are used to characterize the waste. Compliance leaching tests for hazardous waste are generally used to characterize the waste and determine the potential environmental availability/toxicity by mimicking natural conditions that could occur in the environment (i.e., Toxic Characteristic Leaching Procedure (TCLP) and EN12457) or a worst-case scenario (i.e., pH-dependent leaching and sequential extraction). In the present study, the results of the different leaching tests are evaluated in relation to the mineralogical and solid-phase characteristics of the tailings.

Additionally, *in vitro* digestive simulation is used to assess the mobilization of trace elements from the tailings during digestion. Ingestion or inhalation of mine tailing dust particles can be a major exposure path for humans to trace element contaminants, through means of the gastrointestinal tract or exposure through lungs. To understand the bioaccessibility of these trace elements from the tailings, the *in vitro* simple bioaccessibility extraction test (SBET) was performed, which utilizes simulated gastric fluid in conjunction with simulated intestinal fluid. The results of the bioaccessibility tests are compared with the literature from *in vivo* studies to determine the toxic potential of the contaminants.