



Use of limestone filler for the in situ stabilization of soils contaminated by heavy metals: a geochemical modeling

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The incorporation of amendments in the soil for in situ stabilization of heavy metals is one of the most widespread options in the recovery of contaminated soils because these treatments enhance the natural mechanisms of retention of potentially toxic elements (PTEs), facilitate their sorption, and reduce their mobility and bioavailability, although they do not decrease the concentration of the elements. In this respect, the use of calcareous materials may be an excellent, eco-friendly way for recovering this type of soils [2], and this communication reports studies made in our laboratory for such a purpose.

From two industrial soils contaminated with PTEs, mixtures were obtained with different percentages of limestone filler (2%, 15%, 25, 30% and 50%, weight:weight), and then submitted to different environmental conditions (normal rain, acid rain and action of seawater) in a climatic chamber. Several elements, namely As, Cd, Cu, Zn, Cd and Fe were determined in the leachates obtained under controlled conditions of temperature and humidity. The results showed that the optimum percentage of filler to be used in order to obtain a suitable stabilization was around 30%. The mechanisms that control the elimination of leached PTEs are of two types, precipitation (Cd, Cu, Zn, Cd and Fe) and surface adsorption (As). The mineralogical phases present in the mixtures, as well as the precipitation and adsorption equilibria were modeled by appropriate software (PHREEQC) obtaining a similar correlation between the experimental and theoretical results for all cases except for the mixture containing only 2% filler. Likewise, this modeling has been included in the WPHAST and ModelViewer tools to verify the effect of time on a surface of 5 square meters of mixture, obtaining that within 30 years the wear or consumption of the optimal mixture is not foreseeable.