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ELECTROKINETIC TREATMENT FOR THE SELECTIVE REMOVAL OF HEAVY METALS FROM CONTAMINATED SOILS

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The mining and the mineral processing and metallurgical activities, in the town of Linares (Spain), have generated different types of waste materials, associated with the exploitation of galena. Nowadays, these activities are abandoned, and other urban, industrial and agricultural activities are currently present in Linares.

An analysis of the contamination in the mining district of Linares (Martínez et al, 2008) shows that among all the elements compared with their reference levels (Cu, Pb, Zn, Mn and As), Pb is the one that more clearly reveals a significant degree of contamination of the soil.

One of the aims of this work is the study of the electrokinetic remediation technique for the recovery of soils affected by this type of contamination. Electrokinetic soil decontamination is based on the application of a low density continuous current to the soil (about a few mA/cm²) under a low potential gradient (in the range of V/cm). Although the technology implementation is quite simple, the transport processes involved and the geochemical evolution of the soil during the electrokinetic treatment are complex and depend of a number of variables such as soil type, contaminant, composition of the electrolytic solutions and operational conditions. One of the key aspects of innovation in the soil remediation field refers to the development of combined treatments and operational methods that contribute to improve the mobilization and the transport of the contaminants in the soil.

This research tackles the combination of soil electroremediation and soil flushing processes and is directed to a technological development of a competitive process for the selective removal of heavy metals from contaminated soils, that can be applied to soils of different permeability values (permeable, semipermeable and nonpermeable). The soil samples used for this study have been collected from a zone where arrived lixivate of waste slag heaps of smelters in the Linares mining district. The work also includes the study of the effects of contaminant aging and electrokinetic treatment on soil. For this, a cleaner soil was sampled in an agricultural area near the contaminated soil. In the laboratory, this soil has been polluted with Pb, which is the heavy metal in focus of this investigation.

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References

Martínez López, J. Llamas Borrajo, J. De Miguel García, E. Rey Arrans, J. Hidalgo Estévez, M.C. and Sáez Castillo, A.J. (2008). Multivariate analysis of contamination in the mining district of Linares (Jaén, Spain). *Applied Geochemistry* **23**, 2324–2336.