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Electrochemistry Applied to Detect Potentially Toxic Elements (PTE´S) in Contaminated Soils by Mining Residues

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Mining industry in Mexico has been one of the main productive activities of the country (after the conquest); today, the environmental impact generated by the high volumes of sulfurous residues left in the jales dams, is the problem to solve. Climatic characteristics of the sites where the residues are deposited have provoked their dispersion or mobility through an extended area urban or rural, giving place to soils contaminated by Potential Toxic Elements (PTE's) between which are As, Pb, Zn and Cd. On the other hand, voltammetric techniques using carbon paste electrodes (CPE) have been a powerful tool to characterize the oxidation and reduction processes of the pure sulfurous minerals [1-5] (galena, pyrite and arsenopyrite, etc.). However, the characteristics of those minerals are far away from that of the soils. The objective in this work is to detect PTE's in contaminated soils from mining district of Zimapan, Mexico using 0.1 M NaNO3 (pH 6.5) and a soil leached solution as electrolytes.

In this work, experimental tests were carried out concentrating the oxidation products on the CPE surface. The samples used were soils contaminated with low and high concentration of the contaminants. Voltammetric responses of the contaminated soils allowed identify oxidation and reduction processes clearly defined for As, Fe Pb, Zn y Cd species present in the soil. This conclusion was made when a comparative study was carried out through the responses of pure sulfurous minerals [6-7]. The soils showed oxidation and reduction processes in the same potential ranges of the pure minerals. According to the results it is possible to conclude that, the voltammetric methodology with CPE's to detect PTE's in contaminated soils resulted convenient and it can be used in obtaining additional information of the mobility of its species.

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