

Speciation of Hg on three mining districts by XANES techniques

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The mobility, bioavailability and toxicity of mercury in the environment depend on the chemical species in which is present in soil, sediments, water or air. In this work we used synchrotron radiation to determine mercury species in soil and sediments of three mercury mining districts: Almadén (Spain), Idrija (Slovenia) and Asturias (Spain). The aim of this study was to find differences on mobility and bioavailability of mercury on three mining districts with different type of mineralization. For this porpoises we selected samples of ore, calcines, soil and sediment of the three sites, completely characterized by the School of Mines of Almadén, Josef Stefan Institute of Ljubljana and School of Mines of Oviedo.

Speciation of mercury was carried out on Synchrotron Laboratories of Hamburg (HASYLAB) by XANES techniques. Spectra of pure compounds [HgCl_2 , HgSO_4 , HgO , CH_3HgCl , Hg_2Cl_2 (calomel), HgS_{red} (cinnabar), $\text{HgS}_{\text{black}}$ (metacinnabar), $\text{Hg}_2\text{NCl}_{0.5}(\text{SO}_4)_{0.3}(\text{MoO}_4)_{0.1}(\text{CO}_3)_{0.1} \cdot (\text{H}_2\text{O})$ (mosesite), $\text{Hg}_3\text{S}_2\text{Cl}_2$ (corderoite), $\text{Hg}_3(\text{SO}_4)\text{O}_2$ (schuetteite) y Hg_2ClO (terlinguaite)] were obtained on transmittance mode, and the number and type of this compounds to reconstruct sample spectra was obtained by PCA analysis and linear fitting of minimum quadratics.

Mobility was assessed by stirring during 60 minutes with an HCl solution 0.5 M, centrifugation at 3,500 rpm during 10 minutes, and filtering the extract previously to the analyze by ICP-OES.

The results shows differences on efficiency of roasting furnaces from the three sites by the presence of metacinnabar on the less efficient (Almadén and Asturias) and absence on the most efficient (Idrija). On the three sites studied, sulfide species (cinnabar and metacinnabar) were more abundant than soluble species (chlorides and sulfates), and we found a correlation between HgCl_2 presence and mobility indicating that this is the most mobile species.