

1st National Congress of the Mexican Society of Synchrotron Light & 1st International Congress of Synchrotron Light Techniques



Contribution ID : 52

Type : **Poster**

Chemical speciation of lead adsorbed onto volcanic ashes by ICP-OES and XANES

Thursday, 24 June 2021 15:40 (0:10)

Abstract

This study focuses on the assessment of the VA materials from the Moungo zone of the Cameroon volcanic line (CVL) between the mount Cameroon volcano and Mount Koupé, for their use as natural adsorbent to remove Pb(II) pollutant from aqueous solutions. The chemical speciation of lead adsorbed onto volcanic ashes based by means of X-ray absorption near edge spectroscopy (XANES) study is reported. The ashes from Cameroon volcanic line in the Moungo zone (Littoral-Cameroon) are used to remove lead in aqueous solutions. The maximum value of the adsorption capacity of lead in volcanic ashes was 7.60 mg g⁻¹ at pH 5. Regarding the adsorption process, the contribution of the mixture lead components after adsorption and a strong interaction of adsorbed lead with the surface of volcanic ashes were proven. The chemical elements present in the volcanic ash and their concentrations are determined by inductively coupled plasma optical emission spectroscopy (ICP-OES). Chemical speciation was carried out measuring unsaturated, and Pb saturated volcanic ash samples around at the L3 edge (13035) at the XAFS beam line in Elettra Sincrotrone Trieste. The XANES measurements showed that the lead removal occurred mainly by microprecipitation of lead acetate and carbonate (cerussite). In addition, a possible ion exchange is also involved forming lead monoxide.

About

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Session Classification : Poster Session