MINERALOGICAL AND GEOCHEMICAL PROPERTIES OF THE VOLCANIC MUD PRODUCED IN THE FUMAROLIC FIELD OF FURNAS LAKE, SÃO MIGUEL ISLAND, AZORES

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Alongside the northwestern bank of the "Lagoa das Furnas", in São Miguel Island, Azores archipelago, there is a small area locally called "Caldeiras" that corresponds to a fumarolic field.

The local ground is relatively hot being used as a natural kitchen, where cooking is performed burying pots of food properly closed in the earth at depths estimated at 1 m, approximately. The main traditional meals in this manner prepared is the famous "cozido" that consists of mixed meats (pork and veal) and vegetables, and the also famous "caldeirada de peixe" that consists of mixed varied types of fish.

From the fumarole vents, hot springs, whitish smokes and dark greyish mud are profusely produced.

The hyperthermal waters are highly acidic and the mud is assumed to be the result of the secondary alteration of rocks, mainly of trachytic composition, making the volcanic dome that fills the Furnas caldera. This caldera has derived from the collapse of the Furnas stratovolcano.

The trachytic dome that was grown and built over a main vent has been submitted to thorough alteration, providing as end products, either whitish masses enriched in opaline silica or greyish muds enriched in clay minerals, particularly kaolin minerals.

The present paper deals with both the mineralogical and chemical investigation of the mud referred to. X-ray diffraction (XRD) and X-ray fluorescence (XRF) analyses, using Philips diffractometer and spectrometer respectively, have been carried out on samples of bulk mud and of clay fraction.

Bulk mud is composed of kaolinite, alkali feldspar, alunite, calcite, marcasite and opal-A. On the other hand, the clay fraction of the mud consists of the same minerals, differing particularly by its higher kaolinite content.

In terms of chemical composition the bulk mud sample is characterised as follows: SiO_2 40.51%; Al_2O_3 19.75%; TiO_2 1.27%; Fe_2O_3 2.72%; MnO 0.05%; MgO 0.58%; CaO 0.29%; Na_2O 1.93%; K_2O 2.78%; P_2O_5 0.38%; SO_3 4.77%; LOI 25.49%.

Within the trace chemical elements the following deserve particular mention: Zr 1528 ppm; Ba 448 ppm; Sr 29 ppm; Zn 18 ppm; Sn 17 ppm; As 5 ppm; Pb 19 ppm; Cu 9 ppm; Ni 13 ppm; Co 6 ppm; Cr 72 ppm; V 43 ppm.

Also, mud grain size distribution has been assessed on the analysed samples using X-ray based grain size analyser, Sedigraph 5400. The extremely fine-grained mud is characterised by the following granulometric parameters: 100% and 30% of the particles exhibit e.s.d. less than 60 μm and 2 μm, respectively; modal diameter 7 μm; median diameter 4.5 μm. The specific micromorphological features of the mud particles were observed and recorded using scanning electron microscopy (SEM).