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SEM Study and X-Ray Microanalysis of Lateritics from “Los Pijiguaos” Bauxite ore, Estado Bolívar, Venezuela.

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Diverse studies have been made about the chemical and structural characterization of the contained minerals in lateritics profiles, opening the possibility to study morphological transformations of these products along these profiles. At the present time the mechanism of formation of the secondary minerals (clays) is not very clear. Some workers have outlined two possible mechanisms that try to explain their genesis; the first of them consists on the precipitation starting from solutions (dissolution and re-precipitation mechanism), the second mechanism implies the crystallization of these minerals through non crystalline intermediary (1). This has motivated a series of works, starting from which have intended different sequences of transformation of weathering products (2).

In this study some of the minerals present in lateritics profiles development in the bauxite ore of “Los Pijiguaos”, Estado Bolívar, southern Venezuela; were chemical and morphological characterized. The weathering that gives origin to the ore has caused a vertical differentiation of the profile, which can be studied to interpret the morphological transformations that happen to the minerals of the ore. Samples were gathered from the bauxitic residual material residual to different depths and of rocky material at the earliest weathering stages. Samples were separated by ultrasonic technique and fraction smaller than 2 μm was studied (3).
Morphological and chemical observations were made on a HITACHI S-500 electron Microscope, operating at 20 kV with EDS detector and on a EPMA JEOL operating at 20 kV with EDX and WDS detectors. Infrared (I:R), X-Ray Diffraction (XRD) and thermogravimetric analysis (TGA) studies were carried out.

SEM observations and EDS/WDS analysis showed the occurrence of secondary products from primary minerals, it was found out change from tubular halloysite from to spheroidal (Figures 1), as the wheathering increase, which is consistent with decrease in the iron content (Table 1). The transition of halloysite phases occurs in a progressive way, which is indicated by the coexistence of both morphologies (Figure 1), Tazaki et al have reported similar results (4). The tendency to form aggregates of micrograins (Figure 2) can be attributed to the increment in the content of iron oxides in the outer profile, which act as cementantes agents of the particles. WDS and EDS results showed the distribution of concentrations of chemical elements clearly in samples of rocks, which have been used to identify mineral phases and to establish possible alterations of the same ones (Table 1).

I.R. studies allowed distinguish between halloysite and kaolinite in the same sample. SEM and I.R. analysis showed a tendency of the amorphous species to concentrated in the superior zone of the profile. XRD and TGA studies indicated that gibbsite is mainly in the upper part of the profile while kaolin mineral is in the deeper.

The present work allowed to give a clear proof of mineral transformation sequence like tubular halloysite to spheroidal.

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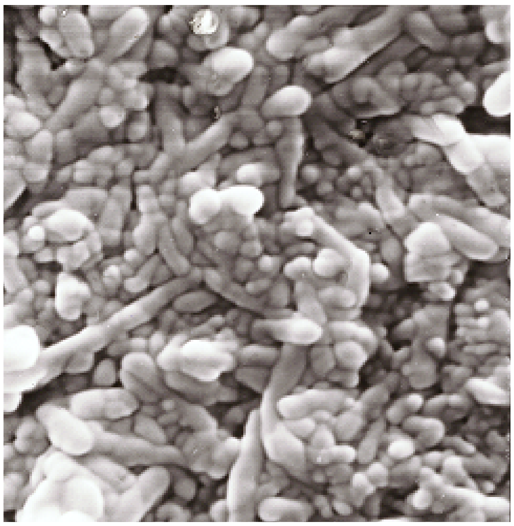

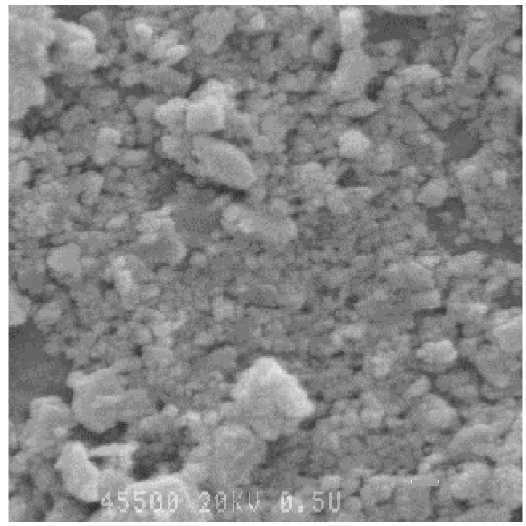

0.5 μm

Figure 1. SEM micrograph of showing coexistence halloysite of two halloysite morphologies.

Figure 2. SEM micrograph showing micrograins.

Table 1. Chemical analyses by EDX in different profile depth.

	(0-1) m	(15-16) m	(36-37) m
Al	36	26	25
Fe	38	41	10
Si	23	30	64
Ti	3	3	1

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