

OCCURRENCE AND GENESIS OF KAOLINITE IN SEDIMENTARY DEPOSITS FROM THE SOUTHERN IBERIAN RANGE (SPAIN)

B. Bauluz, M.J. Mayayo, A. Yuste, C. Fernández-Nieto, J.M. González López

Departamento de Ciencias de la Tierra. Universidad de Zaragoza (Spain)
(bauluz@posta.unizar.es)

The kaolinite-rich clay deposits from the Southern Iberian Range (Spain) correspond to continental clay-sandy series developed during Lower Cretaceous times. The clay deposits are mined by ceramic industry nowadays, and are intercalated with coal levels (lignites) that are also mined for energetic purposes.

We have characterized by XRD, optical, and electronic microscopy (SEM, TEM) the mineralogical composition of a set of 55 samples, emphasizing in the kaolinite features: texture, morphology, crystallinity, and composition. Studied rocks (lutites, limolites, and sandstones) are composed by different proportions of quartz, kaolinite, muscovite, and illite, with minor K-feldspar, pyrite and siderite. The XRD study shows that, in comparison to micaceous phases, kaolinite particles are preferentially concentrated in the finest fractions of the rocks, indicating a lower crystal size. In addition, electron microscopy observations show that kaolinite occurs in four distinct modes: (a) as subhedral-anhedral flakes ($<20 \mu\text{m}$) that are the major component of the lutites. This kaolinite shows a disordered type (XRD). Chemical composition of kaolinite and illite particles (TEM/AEM) show a broad compositional variation. Some of the particles correspond to kaolinite and illite compositions, but most of the analyses indicate intermediate compositions, suggesting the occurrence of submicroscopic intergrowths of kaolinite and illite. The detection of low Ca contents in some analyses indicate the presence of smectite phases in these intergrowths. Probably, this kaolinite was formed by alteration of aluminosilicates (micas and K-feldspars) in the source area of the sediments. (b) as flakes filling pyritized plants in some dark lutites. (c) as subhedral and hexagonal plates, up to $5 \mu\text{m}$ in size, in sandstones. They are replacing

K-feldspar fragments with clear evidence of alteration under SEM. The kaolinites display a high degree of order. (d) as booklets of pseudo-hexagonal plates of kaolinite and muscovite-type mica. These aggregates, up to 30 μm thick, appears mainly in limolites. The growth of kaolinite between the cleavage layers of pre-existing detrital mica resulted in a net increase in volume of the original grain. The delicate fabrics of these intergrowths suggest an in situ origin.

The modes (b), (c) and (d) would have an authigenic origin, being K-feldspar one of the source of components for their formation during the early stages of the diagenesis.