

## QUANTITATIVE ANALYSIS AND VALORISATION OF KAOLINITE FROM CALUQUEMBE (ANGOLA) BY X-RAY POWDER DIFFRACTION AND THERMOGRAVIMETRIC TECHNIQUES

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Kaolin deposits have been for long exploited in several regions of Angola, and some of the most important are produced by weathering of anorthositic rocks from the Cunene complex. However, a systematic research has not been carried out until the present moment. Some extensive outcrops of kaolinitic weathering profiles developed on Precambrian granitic rocks were discovered during a recent trip in the Caluquembe area, in the Huila province (SSE of Luanda).

The present study determined the mineralogical features and thermal properties of the clay minerals from these outcrops. The mineral composition was determined by means of X-ray diffraction, Raman spectroscopy and scanning electron microscopy. The quantitative mineral phase analyses of the samples were obtained by X-ray diffraction profile refinement using Topas V2.2. The thermal behaviour was studied by differential thermal and thermogravimetric analysis.

Whole-rock geochemical analyses on random powders (XRPD) reveal that samples are mainly composed of kaolinite, quartz, feldspars (e.g. albite and microcline) and muscovite. In addition, smectite and hematite have been detected only in some samples. The obtained results indicate that samples present high kaolinite contents (~85 wt%), although a few samples which contain smectite have lower percentages of kaolinite (~28% wt%).

Thermal analyses were carried out to check the quantitative results of mineral phases by XRPD. The differential thermal analysis (DTA) curve shows only an endothermic peak at about 540 °C in dry air which confirms the dehydration of kaolinite [1] in samples lacking smectite. Mass loss in the samples, measured by thermogravimetric analysis (TG), is between 4 to 11 wt% until 650 °C; samples with higher kaolinite contents show the highest mass loss values. The amount of kaolinite calculated by mass loss is between 90 and 25 wt%.

We can conclude that XRPD and TG results have a good correlation and the combination of both techniques is suitable to determine the kaolinite content in this kind of clay deposits. Based on the high content of kaolinite from the deposit of Caluquembe, this area is very suitable for the exploration and potential exploitation of kaolinite, which is a very valuable raw material demanded in the fabrication of ceramics, cosmetics, paper or pharmaceutical products.

[1] MacKenzie, Robert C. (1957). The differential thermal investigation of clays. Mineralogical - Society (Clay Minerals Group), 456 pp.