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# Mineralogy and thermal properties of clay from Slatina (Ub, Serbia)

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The “Slatina” deposit, Ub, Serbia was opened in 1965 and represents one of few deposits exploited by “Kopovi” a.d., Ub, company. Deposit is composed of clay layers belonging to Neogene sediments that are widespread transgressive over granitoid rocks of Cer mountain and Paleozoic and Mesozoic sediments. Clay is mostly of illite-montmorillonite-kaolinite type and they are generally used as ceramic materials while some of the layers are used as fire-resistant materials. In this study we present mineralogical and thermal characterization of two samples to determine their application as industrial materials.

Chemical and mineral composition was determined using inductively coupled plasma optical emission spectroscopy (ICP-OES), X-ray diffraction (XRD) on powder and oriented samples, infrared spectroscopy (IR) and granulometry. Cationic exchange capacity (CEC) and specific surface area (SSA) was determined using spectrophotometry and methylene blue (MB). Thermal properties where determined by gravimetry (120, 350, 600 and 1000 oC) and differential thermal analysis (DTA).

Quantitative mineral composition obtained by Rietveld refinement of combined chemical and XRD data shows that the sample 1(SC) is mainly smectite-illite (45%) and kaolinite (14%) clay with 19% of quartz, 10% feldspars and 7% of limonite, while sample 2(SV) is smectite-illite (43%) and kaolinite (11%) clay with 10% of quartz, 15% feldspars and 7% of limonite. Both samples have low content of impurities (carbonate minerals). Medium grain size ($\mu$m) goes from 1.02 (SSA = 104 m2/g) for sample 1(SC) to 0.71 (SSA = 117 m2/g) for sample 2(SV) while their CEC is 12.7 and 14.9 mmol/100g for 1(SC) and 2(SV) respectively. IR spectra of the samples shows larger amount of smectite clays with quartz and carbonate minerals for both samples which is in accordance with XRD data. DTA data shows couple of events that are endothermic. First one (100-200 oC) is associated with loss of moisture and constitutive water, second (300-400 oC) with iron hydroxide minerals, third (500-600 oC) with smectite clay content with smaller separate bands of kaolinite clays while events between 800-900 oC correspond to carbonate minerals. Loss of mass after gravimetry measurement at given temperatures shows that the samples have significant amount of water in their structure (≈3 wt% (120 oC)) with larger weight loss at 600 oC (3.06 and 3.37 wt%) while total weight loss is 9.12 and 9.08 wt% for 1(SC) and 2(SV) respectively.

The studied clays from “Slatina” deposit have a medium content of smectite-illite minerals with smaller amount of kaolinite mineral together with quartz and feldspars. Based on their mineral composition and characteristics, possible application should be in different types of ceramic and construction industries.

REFERENCES

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