

GEOLOGY, MINERALOGY AND THE USE OF THE BENTONITE CLAYS (PËRRENJASI, ALBANIA)

JUSUFATI, M., GRAZHDANI, E.

Albanian Geological Survey [Shërbimi Gjeologjik Shqiptar], 153 rr. Kavajes, Tirana, Albania
E-mail: Jusufati2000@yahoo.com

Përrenjasi bentonite ore deposit is situated in the south-western part of Albania. It is located in the Quaternary (Holocene) sediments of the Përrenjasi graben structure, which is surrounded by the Middle Jurassic ultramafics, Upper Jurassic-Cretaceous flysch, Upper Cretaceous limestones and Middle Oligocene flysch. The Quaternary deposits are composed of two main sequences: 1) lake-alluvial sediments (Q_{3-4}^{l-al}) (clays containing pebbles of varying composition, intercalated with small silt, sand and gravel layers); 2) alluvial-proluvial sediments (Q_4^{al-pr}) (gravels, sands and clays). The productive bentonite layer is found in the upper part of the second sequence. It is covered by a thin humus layer. The clay deposit is several hundred m long and 4 m thick. It is relatively homogeneous, but locally silty and sandy layers are also recognised. The clays are of brownish to black, greyish to dark grey colour. They are soft, plastic, and greasy and soap like to the touch and have swelling capacity.

The Quaternary deposits of the Përrenjasi graben are considered of the lacustrine-alluvial-marshy origin. The area is inferred a semi-closed basin with only slightly perturbed sedimentation regimen. The ultrabasic rocks, carbonates, gneisses, acid magmatic pebbles of Oligocene conglomerates, basic volcanics, and various sedimentary rocks are the source rocks leading to the formation of the basin sequences.

Prospecting geological works are carried out for the clay deposit assessment. A regular prospecting net 50×50 m and 100×50 m is applied. The hand-made boreholes drillings of 7–16 m depth and 4–5 m deep pits are performed. The works

are accompanied by regular sampling. The qualitative evaluation of the clays is made using chemical, mineralogical, X-ray diffractometric, differential thermal analyses.

On the basis of 84 analyses the average chemical composition of the clays is: SiO_2 49.84%, Al_2O_3 7.61%, Fe_2O_3 12.6%, TiO_2 0.49%, CaO 1.52%, MgO 9.025%, Ni 0.2%, Co 0.018%, Mn 0.005%, Na_2O 0.52%, K_2O 0.49%, LOI 17.8%. Average granulometric composition is as follow: gravel 7%, sand 19%, silt 25%, clay 49%. Plasticity number $I_p = 26$ At, volume weight $\gamma = 1.8$ gr/cm³, Specific weight $\Delta = 2.2$ – 2.6 gr/cm³. X-ray diffractometric analyses supplied these data: montmorillonite 65%, illite 1%, kaolinite 4%, quartz 21%, feldspar 1%. The heavy fraction is composed of hematite, magnetite, and ilmenite. The analytical data suggest that Përrenjasi clays belong to montmorillonite group.

The clays are named bentonites because they show the ability to swell in water, to be slaked and activated by acid. They are used mainly to prepare oil and ore deposits well drilling mud. The mixture of 65–98% water and 2–30% clay is the most appropriate one. Some time, small additives are used as well. Another industrial use is their activation with 2–3% Na_2CO_3 and 0.2–0.3 Na(OH) (solution). Generally, these clays are considered as highly active. The local people used the clays as soap, because they indicate good washing properties. At the same time, they are used as cleaning material of general utilisation.

The exploitation conditions are environmentally friendly.