THE CLAY PRELIMINARY TESTING FROM MUNICIPALITY AREA OF REKOVAC

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ABSTRACT On the territory of Rekovac municipality, geological research has discovered clay deposit "Oparić". The sample was taken from the well core with 9 m depth, then stirred with water and sifted by wet process on a sieve with 0.063mm opening. It was obtained 71 % of reflections (class + 0.063 mm) and 29 % of sieves (class -0.063 mm). The chemical and X-ray analysis of the class -0.063mm was done. The results showed there is increased content of iron in the form of Fe_2O_3, which reduces the clay quality. Further research should focus on finding the iron removing possibility by magnetic concentration.
Keywords: clay, chemical analysis, X-ray analysis

INTRODUCTION

Clay is plastic semi-bound sediment formed by diagenesis (binding) of sludge, pelitic material (grain size below 0.005 mm) transported by water and deposited in an aqueous medium. In addition to clays that become by transporting and depositing sludge material, there are also those that have become and remain at the site of decomposition of the primary material. These are residual or sedimentary clays [1]. Basically, clay consists of one or more main minerals (kaolinite, hydroliskuni-ilite, montmorionite and other aluminum silicates) and various impurities (quartz, zircon, apatite, garnets, iron carriers, etc.) [2]. Within silicates that are determined as clays, there are two distinguished groups: crystalline representatives (group of kaolin, pyrophyllite, montmorillonite, illite and halosite) and amorphous representatives (allophane). All crystalline representatives are phyllosilicates. In addition to silicon, they contain aluminum and significant amounts of water. The composition differences of these minerals are mainly due to the different ratios of silicon and aluminum between the components. Impurity components appear only in traces and in small quantities [3]. Clays are rocks that, depending on their purity, can have great use in various industries. Kaolinite clays are raw materials for the porcelain industry, montmorillonite for molds in the refractory industry, and impure clays are used in pottery. The clay has also use in the ceramics industry [4, 5, 6].

EXPERIMENTAL

A sample of clay for testing was taken from the well core with 9 m depth at the Oparić site. The sample was stirred with water and sifted by wet process on a sieve with 0.063 mm opening. A mass fraction of reflections of 71 % (class + 0.063 mm) and sieves of 29 % (class -0.063 mm) was obtained. Having in mind that impurities in clay are concentrated in larger classes, the smaller class -0.063 mm was taken for further examination. This size is the most frequently required class for various applications. Chemical and X-ray diffraction (XRD) analysis were performed on the selected class. The atomic absorption spectrophotometer "Perkin Elmer" -Analyst 300 was used for chemical analysis. X-ray diffraction analysis was performed on an X-ray diffractometer device brand "PHILIPS", model PW-1710.

RESULTS

The chemical and XRD analysis was performed on the class -0.63+0.1 mm and the results are shown in Table 1 and Figure 1.

Table 1-Chemical analysis of class -0.63 + 0.1 mm clay from deposit "Oparić"

Component	SiO_2	Al_2O_3	MgO	CaO	Fe_2O_3	Na_2O	K_2O	TiO_2	LoI
%	56.00	14.72	0.462	6.29	7.93	0.803	2.63	0.335	10.78

CONCLUSION

Based on preliminary clay quality tests of the "Oparić" site, it can be concluded that this raw material has limited application due to its chemical composition. Namely, in addition to the minerals kaolin, illite and smectite, this clay contains a high content of iron, which affects the poor clay quality and reduced its use. Iron can be removed by magnetic concentration, only if it is not chemically bound, but if Fe-bearing minerals are located between the layers of the crystal lattice of clay minerals. The removal of iron from the clay sample of the mentioned locality and the clay minerals concentration is the subject of further research by the authors of this paper.

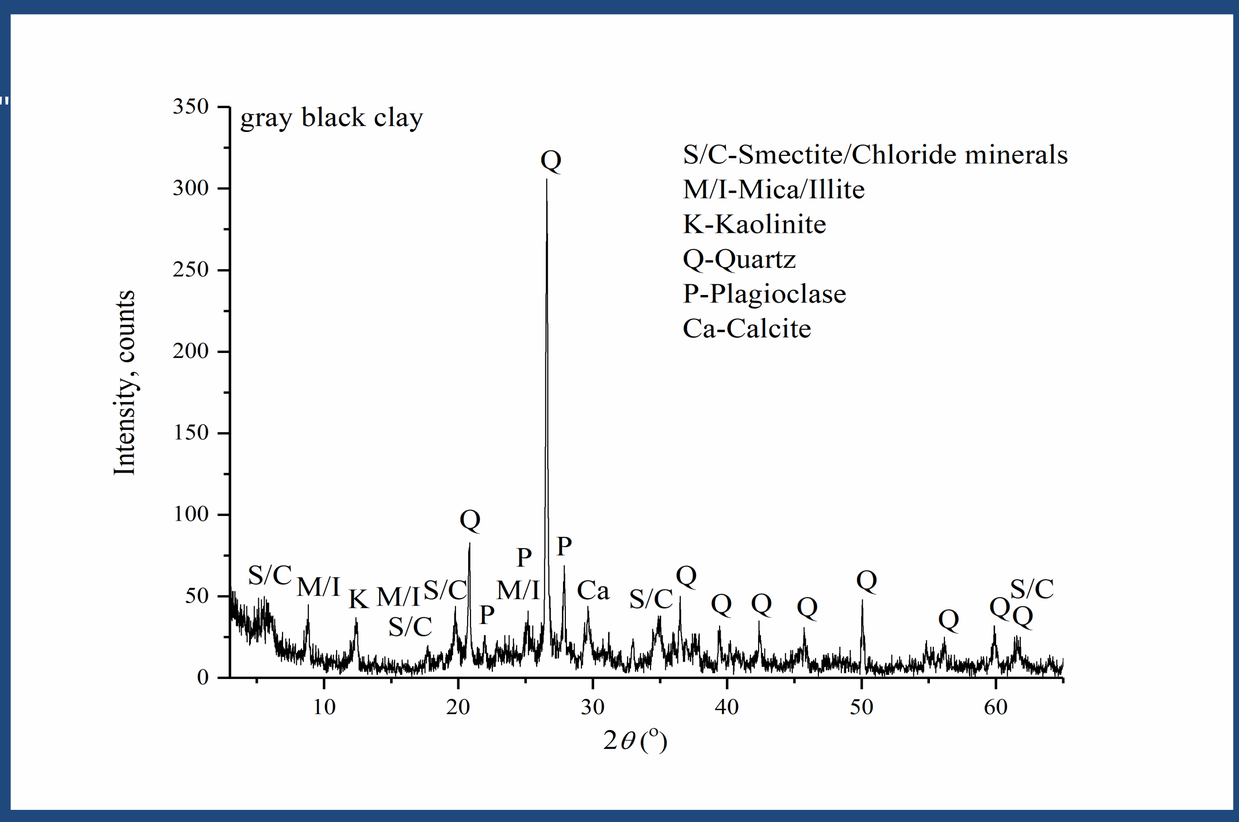

Figure 1 - Diffractogram of clay powder sample "Oparić"

ACKNOWLEDGEMENT

The authors wish to acknowledge the Ministry of Education, Science and Technological Development of the Republic of Serbia for financial support of the research whitch results are presented in the paper (contract 451-03-9/2021-14/200023 and 451-03-9/2021-14/200026).

REFERENCES

[1] S. Janković, B. Vakanjac, Ležišta nemetaličnih mineralnih sirovina, Građevinska knjiga, Beograd, 1969.
[2] V. Đorđević, P. Đorđević, D. Milovanović, Osnovi petrologije, Nauka, Beograd, 1991.
[3] M. Ilić, S. Karamata, Specijalna mineralogija (Deo I) Pregled petrogenih minerala, Građevinska knjiga, Beograd, 1963.
[4] http://www.gef.bg.ac.rs/wp-content/uploads/UPOTREBA-STENA.pdf
[5] M. Tecilazić-Stevanović, Osnovi tehnologije keramike, Tehnološko-metalurški fakultet Beograd, 1973.
[6] S. Popov, Lj. Kostić-Gvozdenović, Neorganska hemijska tehnologija, Univerzitet u Beogradu, Rudarsko-geološki fakultet u Beogradu, 1984.