**INTRODUCTION**

• Clay represents a type of material that has been used since long ages. In the present use, they are still widely in various industries such as agriculture, building construction, ceramics, pharmaceuticals, etc.

• The domains in which a certain type of clay is used depends on their chemical and mineralogical composition which determines its properties. In certain domains these characteristics must strictly abide by imposed standards of stability and safety.

• This study aims to make a fast elemental composition analysis for clay materials for which the XRF spectrometry was used because it is a modern technique which provides quick analysis at studies from different domains, in it, as it does not require any preprocessing of the sample, it is time and cost effective and it does not produce waste.

• In the case of this study the aim of this method was the determination of heavy metals compositions present in the clay. The results presented are obtained from 24 h of gamma ray emission measurement. The samples were acquired from the commercial market, originating from both Romania and other countries. The place of origin is actually very important for clay as it determines certain compositions or properties, which may or not limit their utilization.

• In order to properly use the clay in the construction, it is an important fact to know its natural or artificial composition. After the X-ray radiography, the samples were also analyzed with the gamma spectrometry for a complete overview and characterization, which may be used for determining the use of each type of clay.

**RESULTS**

• The determination of radionuclides using clays is not a new method, but it has proved efficient in certain cases. The efficiency for each case must be analyzed and if the results are satisfactory then further proceeding for the determination of radionuclides. For this purpose, it is necessary for a characterization study of the clays to be done and to have a study of controlled contamination in order to be able to determine the demarcation factor. This paper refers to the first stage - the characterization of the available clays.

• The results of the determination of the heavy metal content in the clay samples presented in Table 1 and the radioactivity concentration determined are presented in Table 2. From the elemental XRF it has been found that:
  - 87% of the clay samples contain <LOD = 0.0027 ppm Co, 0.003 ppm Pb, 0.004 ppm Pt, 0.004 ppm As, 0.01 ppm Cs, and 0.0032 ppm Cu.
  - 75% of the clay samples contain <LOD = 0.0027 ppm Co, 0.001 ppm Cs, and 0.0032 ppm Cu.
  - Only 3% of samples contained Mo with a concentration of 0.0061 ppm.
  - All samples contained elements such as Zn, Cu, Ni, Cr, V, and As in quantities with a higher order of magnitude than O2 and Fe.
  - The most abundant element found in the samples was Fe.
  - There were traces of Ca and Mg in the samples.
  - The chemical composition of clays may vary depending on the geographical area and the environmental conditions. Factors that may influence the quantitative determination of heavy metal in the samples analyzed are the soil characteristics, which are more or less rich in Fe, the natural waters from areas, the rainfall (rain), the pollution used for the soil, etc.

**CONCLUSIONS**

• Clay, anodic vitrification from (Romania) and sands from (Romania) were radiochemically characterized and their content of heavy metals was analyzed, as they are capable of isotopic exchange and migration from their structures. These materials were studied with the purpose of using them as filtering and absorbent materials in the nuclear field, namely for retaining and concentrating the radioclines in liquid wastes resulted from decomposition processes or radioactive pollution. The ultimate goal is:
  - to obtain a cross-aggressive demarcation that result in natural radium as possible
  - to separate others the radionuclides from the absorbent for the researches of waste low cost

It is important to determine the heavy metal content for each of these materials because chemically concentrations may appear as a result of the materials’ recovery.

• Considering the multitude of uses of clay, especially in the fields that require the direct contact between the user and the clay or the products that contain it, knowing the amount of impurities is compulsory, especially heavy metals and natural radionuclides that may possibly contaminate.

**REFERENCES**


**XRF – SPECIFICATIONS**

• The spectrometer has, as a basic precaution, a tube of 5 µm with 90% installed behind the beryllium window. During the sample analysis the voltage is used in the range of 5–60 kV and the current in the range of 5–50 µA.

• Most of the materials obtained in this work showed fairly low levels of radioactivity. The values obtained are lower than the internationally recommended limits for building materials. The results indicate an acceptable low biological risk arising from the use of these raw materials in buildings construction and probably in other industrial field (paper industry, metallurgical industry, etc.)

• The results obtained are very well in agreement with those reported in many European countries.

• The surveillance of the natural mineral rocks is not a new subject. This must be done continuously to get consistent data with international values. The analyses performed on the samples of natural mineral rocks are consistent with the European Directive 81/517 transposed into Romanian standards of Ministry of Environment, National Commission for Nuclear Activity Control (CNCAN) and Ministry Health and others.

• The assessment presented in this paper on the natural radioactivity in mineral clay samples comes to update at least some data on activity concentration and effective doses due to intake of natural radionuclides. The obtained data provide basic information for consumers and competent authorities to be aware of radiation effects on human health.

**REFERENCES**


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