GLAUCONITIC GRAINS IN THE MAGURA BEDS FROM THE POLISH OUTER CARPATHIANS

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Oligocene deposits containing glaucony which crop out in the northern part of the Magura Nappe in the Polish Outer Carpathians were investigated from the mineralogical and sedimentological point of view. The upper part of these deposits called the Magura Beds consists of sandstones and shales. They are up to 900 m thick and are considered to be formed by gravity flow processes in weakly oxic environment (Leszczyński and Malata, 2001). Five representatives samples of sandstones were collected from two profiles in Ropica and Folusz villages.

To separate glauconitic grains, the samples were disaggregated and sieved to obtain the size fraction > 0.063 mm. The fraction was then magnetically separated, submitted to acetic acid treatment and ultrasonic cleaning to remove carbonates and any potential contaminants. Finally, non-glauconitic grains were removed by hand-picking under a binocular microscope. The purified glauconitic sample was submitted to further investigations: the morphologic features and internal structure were studied by applying optical microscopy and scanning electron microscopy, the EDS analyses gave a statistical approximation of the chemical composition and basic mineralogical data were obtained using X-ray powder diffraction.

In the studied beds the glaucony occurs only as a granular facies. The green grains are one of the components of the framework in which they constitute up to 10% of the composition. The grain size ranges from 0.06 to 0.5 mm but the fraction < 0.2 mm is predominant. The grains are mainly dark green in colour (light coloured grains represent only a few percentage of each sample). They exhibit mostly three types of morphological forms: spheroidal-ovoidal, tabular-discoidal and irregular, which is characteristic of broken grains. Usually the surface of the grains is smooth and glossy but cracked grains are also frequent. SEM observations revealed random aggregate of flakes within the grains as the only microstructure.

X-ray diffraction analyses show high degree of structural ordering of studied glaucony. Almost all peaks in the diffractograms assigned to evolved and highly evolved glaucony (sensu Odin and Matter, 1981). Some features such as: the positions of first order basal reflection (001), between 10.0–10.3 Å in studied samples, presence of the sharp $(11\bar{2})$ and (112) reflections indicate high degree of glaucony evolution. Nevertheless, absence of the $(11\bar{3})$ and (021) reflections and usually asymmetrical shape of (001) reflection is evidence of small amount of expandable layers in the glaucony structure. The observed d(060) value equals 1.511 Å in three diffraction patterns and 1.512 Å in two others. The chemical composition of the glaucony is as the average reported in the references (Wiewióra and Łącka, 1980), except the SiO_2 content which is higher (51.4–58.3%). The Al_2O_3 content varies from 8.9% to 13.5% and the amount of Fe_2O_3 varies from 15.9% to 23.2%. All samples are characterised by high content of K_2O (> 7% up to 8.6%). Some amounts of MgO, NaO and TiO_2 were also determined.

The chemical composition and X-ray parameters of glaucony samples from both profiles are similar. Only minor differences between these samples were observed. The data indicate that glauconitic grains of each sample reflect the evolved or even highly evolved stages of glauconitisation.

References

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