CLAY MINERALS IN THE JURASSIC (TOARCIAN-AALENIAN) EPLÉNY LIMESTONE FORMATION, ÚRKÚT, HUNGARY

PEKKER, P.,[1] WEISZBURG, T. G.,[1] FÖLDVÁRI, M.,[2] POLGÁRI, M.[3]

[1] Department of Mineralogy, Eötvös Loránd University [Eötvös Loránd Tudományegyetem Ásványtani Tanszék], Pázmány Péter sétány 1/c., Budapest, 1117, Hungary
[2] Geological Institute of Hungary [Magyar Állami Földtani Intézet], Stefánia út 14., Budapest, 1143, Hungary
[3] Laboratory for Geochemical Research HAS [MTA Geokémiai Kutatólaboratórium], Budaörsi út 45., Budapest, 1112, Hungary
E-mail: pekker.peter@vipmail.hu

This study focuses on the clay mineral content of the Middle Jurassic Eplény Limestone Formation, which forms the sedimentary cover of the Úrkút Manganese Ore Formation in the Bakony Mountains, Hungary. The Eplény Limestone Formation is constituted by two alternating lithologies, a siliceous and a clayey one, having irregular thicknesses. The clayey type is mostly loosely cemented, green to greyish green, while the siliceous type is a very hard, light grey rock strongly cemented with silica. Preliminary XPD investigations on bulk samples show the following mineral phases in the clayey type: sheet silicates (with 10 and 15 Å 001 reflection), calcite, quartz, dolomite, possibly some feldspar and in some samples opal. The siliceous type contains sheet silicates under detection limit in almost all cases, the mineral constituents are quartz, opal, calcite and sometimes very little amounts of double carbonate.

Based on the results above we selected two samples to characterise the clay content of the clayey lithology. Grain separation was done through crushing and acid treatment (sample U4/98, 5% HCl) or without crushing and leaching in distilled water (sample 121301), followed by wet sieving (to produce a size fraction below 32 μm) and settling in distilled water (to separate the < 2 μm fraction).

The fractions below 2 μm separated this way were investigated through XPD on oriented and ethylene glycol treated samples. Oriented XPD on sample 121301 showed the presence of four sheet silicate phases, with 14.4 Å, 12.8 Å, 10 Å and 7 Å 001 reflections. After the ethylene glycol treatment the 14.4 Å and 12.8 Å reflections shifted to 17 Å, identifying the two phases as smectite and mixed layer illite-smectite, respectively. The 10 Å, non-swelling phase is a mixture of detrital muscovite and illite, the 7 Å phase is kaolinite. The same phases can be observed in sample U4/98 as well.

On the basis of bulk chemical composition sample U6/98, also belonging to the clayey rock type, showed a total of 29–46% sheet silicate content, depending on aluminium substitution in the tetrahedral layer and the distribution of divalent cations among carbonates and sheet silicates.

Thermoanalytical investigation of the same sample (U6/98) revealed 25% illite-muscovite, 6% montmorillonite and 1.5% kaolinite content of the bulk rock.

In comparison with a study on the clay mineralogy of Jurassic carbonate rocks in the Transdanubian Range (Viczián, 1995), only the Toarcian manganese carbonate sequence shows a clay mineral content (significant proportion of smectite) similar to this study. Since the carbonate manganese sequence is the sedimentary base of the Eplény Limestone, a strong genetic connection between the two formations can be assumed. The similarity in clay mineral content and other sedimentological, mineralogical and micropalaeontological characteristics suggest that the two formations represent the same depositional environment. Therefore the only essential difference between the Eplény Limestone Formation and the Úrkút Manganese Ore Formation is the manganese enrichment of the latter. The above considerations suggest that the manganese enrichment appeared only in a certain part of a sedimentary basin, independently from sedimentary processes as reflected by the clay mineral content of rocks.

Reference

VICZIÁN, I. (1995): Clay mineralogy of Jurassic carbonate rocks, Central Tansdanubia, Hungary: Acta Geologica Hungarica, **38**, 251–268.