

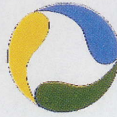
# Támogatóink



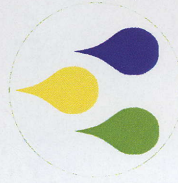
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methods can help to understand the relationships between the different systems and complement the general hydrogeological data processing.

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### ***Microfacies associations and depositional environment of the Triassic slope and basinal deposits (Aggtelek-Rudabánya Hills, NE Hungary)***

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Recent work revealed several specific microfacies textures in the Middle and Upper Triassic slope and basin carbonates in the Aggtelek-Rudabánya Hills, NE Hungary. Thin section analysis of more than 1800 samples was carried out. Based on the resulting data six microfacies associations (MA) including 15 microfacies types were distinguished. MA-A comprises five different types of clotted micrite boundstone that are characterised by *in situ* precipitated calcite as a result of degradation of organic compounds. Other common features are the elongated, occluded pores called stromatolitic structures. Microfacies types A1, A2, A3 and A4 formed on a carbonate slope occupied by a microbial mat while A5 is related to a platform/margin environment. MA-B contains four bioclast-rich packstones and grainstones with different skeletal grain compositions.

Types B1, B2 and B3 were likely deposited via short-term depositional events, e.g. storms, turbidites and mass flows; B4 can be interpreted as a fore reef slope facies. The four types of wackestone containing pelagic fossils in MA-C represent open marine deposits. MA-D is peloid packstone-grainstone consisting of encrusted reef detritus that was reworked onto the upper slope. The mudstones of MA-E occur exclusively at the base of rapid facies changes.

The palaeoenvironmental reconstruction revealed a slope controlled by microbially mediated carbonate production which was occasionally intercepted by platform-originated grain input and downslope redepositional processes. The distal slope and the basin were devoid of microbial activity; instead they were characterised by calm sedimentation.

### ***Reaction of clay standards with carbon dioxide saturated water at 70-180 bars and 85-100 °C***

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Cap rocks play an important role regarding the safe underground storage of CO<sub>2</sub> in saline aquifers because as a physical barrier they prevent CO<sub>2</sub> migration toward the surface, thus avoid potential leakage. Hence, extensive understanding of physical and geochemical properties of cap rocks is necessary to establish safe CO<sub>2</sub> storage conditions. Due to the commonly high clay mineral content of cap rocks, the reactivity of these minerals must be well-studied in CO<sub>2</sub> saturated reservoir conditions. Numerous scientific papers were published in the last few years in terms of physical properties of cap rocks, however there are still few articles regarding their geochemical behavior.

Therefore, the main aim of the present study is filling the gap of experimental results in order to understand better the geochemical behavior of CO<sub>2</sub> – brine – clay mineral system. For this reason, laboratory experiments and geochemical modeling were carried out in

high-pressure (70-180 bars) and high temperature (85-100 °C) conditions using international clay mineral standards (illite, kaolinite, Na-montmorillonite). The experimental p-T conditions are corresponding to the potential storage conditions in Hungary at 1500-1800 m depth (taking into account 50 °C/km geothermal gradient). The duration of the experiments was 1-2 weeks. The resulting solid phases were examined by ATR-FTIR and XRD, whereas the fluid compositions were measured by ICP-AES. For comparison, control samples were also studied the same way as the CO<sub>2</sub>-exposed samples.

The experimental results indicate total dissolution of initial carbonates and slight increase in the amount of smectite in the CO<sub>2</sub>-treated samples. Furthermore, the experienced swelling of initial d001 spacing by ~1 Å in smectites could be the result of both Ca-exchange and CO<sub>2</sub> incorporation into the interlayer.

#### *Quantitative mineralogical analysis of the Úrkút Mn-carbonate ore*

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Theoretical

The Úrkút deposit is a black shale hosted Mn-carbonate ore. The aim of this study was to determine its quantitative mineralogical composition in relation with its geochemistry.

90 samples were investigated by XRD analysis using Rietveld refinement method. The results were compared with data obtained by bulk chemical and local SEM-EDX analysis, together with optical description.

It was found that the Mn-carbonate ore consists of various types of carbonates, smectites, 10Å phyllosilicates, mixed-structure phyllosilicates and goethite in a variable extent. Occasionally, hematite, apatite, gypsum, baryte and quartz can also be determined by XRD analysis. Other minerals such as muscovite, sulfides (chalcopyrite, Co-sulfides) and monazite are observable only by SEM.

Carbonates are mainly Mn-dominated, but dolomite is also common. Minor amounts of Fe and Mg are always present in the carbonate lattice.

The XRD results show that there is a strong correlation between optical properties and mineralogical composition. Most ore types

contain at least 20 wt% phyllosilicates. Three main groups can be distinguished according to the phyllosilicate content. The first group contains both 10Å phyllosilicates and smectites, in the second group only 10Å phyllosilicates occur. The third group, the grey ores contain small amount of goethite and phyllosilicates, which is smectite dominated.

Brown ore gets its colour from goethite which is well recognizable also by the naked eye, as it is a strongly colouring constituent. Green ore is coloured by celadonite, reddish brown ore by goethite and hematite and black ore by manganite.

These observations imply that the main mineralogical composition of the different ore types in Main Bed can be well assumed by their macroscopic appearance. Better understanding of the mineralogical nature of the ore and host rock can make production more efficient.

#### *Dendrochemical studies in Ajka and its surrounding*

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Dendrochemical studies show that the tree ring analysis in the temperate zones, due to the annual growing of the rings, is a usable and sensitive tool to shed light on environmental pollution. To test this technique, we studied Ajka city and its surrounding, which have been one of the most polluted industrial cities of Hungary in the past.

Oak and pine tree samples were taken from the city center of Ajka and from two other locations: one to the northwest from the city in the Széki-erdő Nature Reservation Area of Devecser and one to the southwest, in Ajka-Csingeri-Parkerdő. All samples were taken in the prevailing wind direction from the north-western side of the trees at 120-150 cm height from the ground. One selected sample was analyzed from each location. All samples were dried at 60 °C and divided to subsamples containing sections of 5 years. The Al, As, Cd, Co, Cr, Cu, Mn, Ni, U, Pb, Ti, V and Zn concentrations of the samples were determined by ICP-MS.