

Diagenetic evaluation of Pannonian lacustrine deposits in the Makó Trough, southeastern Hungary

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The Makó Trough is the deepest sub-basin of the Pannonian Basin. As a possible shale gas and tight gas accumulation the area was explored by several hydrocarbon companies. In this study, we present the preliminary results on the diagenetic history and the porosity evolution of sandstones and shales. Petrographic (optical microscopy, CL, blue light microscopy) and geochemical methods (SEM-EDX, WDX, O and C stable isotopes) were applied on core samples of Makó-7 well (3408- 5479 m).

Processes which influenced the porosity evolution of the sandstones were compaction, cementation, mineral replacement and dissolution. The most common diagenetic minerals are carbonates (non-ferroan and Fe-bearing calcite, dolomite and ankerite), clay minerals (kaolinite, mixed layer illite-smectite and chlorite) and other silicates (quartz and feldspar). Initial clay mineral and ductile grain content also influences reservoir quality.

The volumetrically most significant diagenetic minerals are calcite and clay minerals. The petrography of calcite is variable (bright orange to dull red luminescence color, pore-filling cement, replacive phases which are occasionally scattered in the matrix). The $\delta^{13}\text{C-PDB}$ values of calcite range from 1.7 ‰ to -5.5 ‰ while $\delta^{18}\text{O-PDB}$ values range from 0.5 ‰ to -9.1 ‰ no depth related trend was observed. These data suggest that calcite occurs in more generations, i.e. eogenetic pre-compactional and mesogenetic post-compactional. Kaolinite is present in mottles in size similar to detrital grains, where remnants of feldspars can be seen. This indicates feldspar alteration via influx of water rich in organic derived carbon dioxide. Secondary porosity can be observed in carbonates and feldspars at some levels, causing the improvement of the reservoir quality.