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TYPOMORPHIC PECULIARITIES OF CAMBRIAN CLAY OF ST. PETERSBURG REGION

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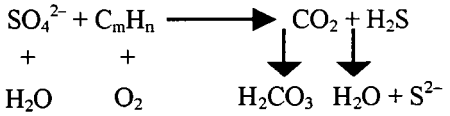
The Lower Cambrian "blue" clay of St. Petersburg region is a unique geological object in many aspects. Peculiar interest to these rocks is caused by their slight digenetic transformation taking into account their considerable age (> 500 million years) and their great thickness (cca. 150 m). The region of study is part of the northeast region of Russian Platform. These rocks have big practical importance as building and ceramic materials, otherwise Cambrian clays are regarded to be oil-bearing rocks (deposits in Kaliningrad). In recent times the clays are also studied as very perspective rocks for burial of radioactive waste.

Aim of this work was to make clear the mineral composition of the clays and some features, concerning the clay and sulphide minerals.

The Lower Cambrian clays were divided by a centrifuge into two parts: a pelite and a heavy fraction, which were analysed by X-ray powder diffraction, microprobe and optical observation. The following mineral groups and species were determined: allotigenic minerals are quartz, feldspar, almandine, ilmenite, zircon, kaolinite, chlorite and partially illite; the authigenic minerals are mixed layer mica-smectite, transformed illite, chemical-biogenic pyrite, marcasite, troilite (?) and carbonates. In the pelite fraction interlayer deficient mica of illite series with the polytype $1M_d$ predominates. The changes in symmetry and shape of 001 reflection of mica before and after saturation by glycol indicate increasing smectite contents in mixed layer phase in deeper parts of the section. In the pelite fraction there is also admixture of kaolinite and chlorite. Backwards zone in montmorillonite-illite transformation can be explained by migration of hydrocarbons in sedimentations, which lay up expanded structures and stopped their transformation into illite.

The region studied doesn't include oil deposits. It can be related to its position on the flanks of a syneclise, and resulting shortage of sedimentary and organic matter. Sulphides in the sedimentary basin were formed in several levels of the water-sedimentation regime by bacterial sulphate reduction of dispersed organic matter:



Formation of sulphides in the clays goes on by deepening of the sedimentary basin, where the process of sulphate reduction gives way to the dissociation of H_2S. Otherwise there are also processes of material redeposition, causing enrichment of S^{2-} ions.

The unique feature of the object studied is its weak postsedimentary transformation, which makes possible to observe phenomena, typical for regions with oil and gas deposits: backwards zone in montmorillonite-illite transformation and sulphide mineralisation, such phenomena are normally concentrated in oil-deposit regions.