On characteristics of fluids of attenuated stages of the mudvolcanism within the limits of the Kerch Peninsula, Ukraine (by data of inclusions research in the gypsum)

Ihor Naumko, Larysa Telepko, Vasyl Gladun, and Petro Chepil

Eruptions of mud volcanoes widely distributed in the geological history of the Earth are directly connected with the oil and gas deposits. Therefore, data on studies of minerals, products of mud volcanoes activity and fluid inclusions in them, can be used with the purpose of prediction of the oil and gas presence. Inclusions in the later gypsum from emissions of mud volcanoes of the Kerch Peninsula of the Ukraine (Shnyukov et al., 1971) were studied with the purpose of reconstruction of fluids of attenuated stages of the mud volcanism.

Discharge of gypsum is found in fractures of shriveling clay rocks. Mineral is represented by individual watery-limpid plate-like crystals (from 1 to 3 mm) with zones of the growth clearly delimited by solid powders or coarse plate-like joins composed of separate individuals of ~ 5x7 mm in size.

In gypsum, inclusions of aqueous solutions were exceptionally found. Primary inclusions are negative crystals in the plane of eminent cleavage stretched along the third crystallographic axis, and in the plane (010) having a form of long rectangles and hexahedrons, rarely: flat long vacuoles of fir-like location connected with the pyramids of growth. Secondary inclusions are found in the planes of cleavage and in the healed fractures crossing the plane (010).

Data of mass-spectrometry have demonstrated that volatile of inclusions in gypsum are enriched with nitrogen (81.7–94.1 vol. %) with subordination of CO_2 (5.9–18.3 vol. %).

The studied gypsum formation occurred at later attenuated stages of the mud-volcanic activity at near-surface conditions in low-temperature heterogenous aqueous medium from residual porous solutions. These solutions, filtered by clay rocks, were practically void of pelitic material and hydrocarbon constituents. In contradistinction to them, solutions from the beginning of the mud-volcanic activity are characterized by the presence of methane of high density and hydrocarbons captured together with aqueous-pelitic mass by inclusions in calcite (Kalyuzhnyi et al., 1984) and early gypsum (Kul`chickaya et al., 1984) during its emission through the mouth of the mud volcano to the surface. Activization of the mud-volcanic activity in the Kerch Peninsula and accompanying vertical-migrational processes are known to be the fragment of the intensive migration of hydrocarbons in rock complexes of the Mountain Crimea and the north-western shelf of the Black Sea in the Middle Miocene epoch (Gigashvili et al., 1978). Their relicts are observed in diabases from the pre-Cretaceous complex and micaceous shist from the basement and characterized the high CH_4-content and its homologues and considerable gas saturation of fluid inclusions and closed pores of those rocks (Naumko et al., 2007).