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Transformation of organic matter of rocks from domanik deposits in hydrothermal and pyrolytic processes

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Abstract

© SGEM 2017. All Rights Reserved. The objects of the study were samples of Domanik rock from Upper Devonian siliceous-carbonate and carbonate sediments of the Romashkino oil field, which occurs in the central part of the South Tatarian arch in Tatarstan. The composition of organic matter and mineral rock components and bitumoids extracted from them was studied by thermal analysis, X-ray diffraction analysis, SARA analysis and gas chromatography. Significant differences in the mineralogical composition and content of organic matter are found in samples after their hydrothermal treatment at a temperature of 350°C in the steam medium at the carbon dioxide. Based on the example of these rock samples, pyrolytic experiments were conducted to simulate the processes of conversion of kerogen to free micronized oil at temperatures of 350 and 600°C in a hydrogen medium in a flow system. The content of Mn²⁺, SO₃²⁻, SO₂²⁻ ions in the rock, as well as ions of vanadyl (VO²⁺) and free radicals (R*) in the pyrolysis products were evaluated using Xband electron paramagnetic resonance (EPR) spectroscopy at frequency of 9.43 GHz. The most significant changes associated with an increase in the concentration of free radicals were observed at 350°C. A new free organic radical C350 was registered in the sample of siliceous-carbonate sediments and a free organic radical C 600 – in carbonate sample, which indicate that the studied rocks did not fully realize their potential in natural hydrocarbon generation processes.

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Keywords

Hydrothermal processes, Kerogen, Organic matter, Pyrolysis, Rocks of Domanik deposit

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