

MODIFICATION OF THE HETEROCYCLIC COMPONENTS OF OVERMATURE ORGANIC MATTER (TYUMEN-6 WELL)

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In the Institute of Petroleum Geology and Geophysics (IPGG) SB RAS, a geochemical study of organic matter (OM) of the Western Siberia deep-seated Jurassic, Triassic and Paleozoic rocks have been carried out since the beginning of the 90s [1]. The purpose of this work is to summarize the available data on the composition and structure of high-heterocyclic components (asphaltenes, asphaltogene acids, benzene and alcohol-benzene resins) in harsh temperature and pressure conditions in deep-seated Triassic rocks. The study of the composition and structure of asphalt-resinous components includes physical and physicochemical methods complex: elemental analysis, NMR, EPR spectroscopy, mass-spectroscopic determination of carbon isotope composition [2].

The results of the investigation lead to the following conclusions.

1. In Triassic rocks, it is recorded changes in the content of resin-asphaltenes components during burial. Asphaltenes content drops to 0% at the depth about 6600 m, while the concentration of alcohol-benzene resins rises sharply. These processes occur in parallel with the increase in the share of highly condensed aromatic hydrocarbons in naphthenic-aromatic fractions [1, 3].

2. Resins and asphaltenes are of great concern in the new hydrocarbons (HC) generation. In this study, the evolution of the resin-asphaltene components in demi-coal-bearing strata under catagenesis during burial have been shown. During apocatagenesis, the carbonization process of asphaltenes changes, on the one hand, into their polymerization and transition into insoluble forms, and on the other hand, into aliphaticization and partial transition of their lighter form into resins, and the latter into aromatic HC. Similar processes at greater depths were first set out in the A.E. Kontorovich and I.D. Polyakova et al [4] and L.M. Gabinet and M.P. Gabinet [5]. According to their investigations, asphaltenes disintegrated already at the depths of 5300 m (Vilyuiskiy basin) and of 5500 m (Dneprovsko-Donetskiy basin).

3. It is known, that overmature asphaltenes of terrestrial OM, which consists of aromatic and short alkane fragments, generate mainly methane and its homologs. Marine OM, which consists of naphthenic rings and long aliphatic chains, can generate a variety of different types of hydrocarbon compounds [1]. In comparison with deep wells in the Vilyuiskiy [4] and Dneprovsko-Donetskiy basin [5], Tyumen SG-6 well at a depth of 6500 m contains the asphaltenes, and they have an aliphatic structure. This is due, apparently, to the presence polimer-lipide material in the OM of Tyumen SG-6 well.

Thus, a detailed investigation of the resinous and asphaltene components of Tyumen SG-6 well using the physical and chemical methods has allowed supposing additional HC generation due to the degradation of asphaltenes.

References

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