

Biomarkers of Organic Matter and Oil from Sedimentary and Crystalline Rocks and New Geochemical Criteria of the Restoration of Conditions of Shale Strata Formation (on example of the Volga-Ural region, the East European platform)

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The composition of oils and bitumens from different strata of the Paleozoic sedimentary cover and Precambrian crystalline rocks were studied. It is widely known that chemofossils (biological indicators) carry the information about the original syngenetic organic matter (OM) and are often used as correlation parameters for the detection of the conditions of sedimentation, identifying the diagenetic environments, the degree of catagenetic transformation and the maturity of dispersed syngenetic OM. The main feature of these hydrocarbon compounds is the ability to change the spatial position of certain atoms when the conditions of the dia- and catagenesis process are changing. The study of biomarkers was carried out with the help of chromato-mass spectrometry in the Laboratory of Geochemistry of Fossil Fuels, Kazan Federal University. GC/MS method was used in oil to investigate the individual composition of naphthenic hydrocarbons, primarily steranes and terpanes and another new biological markers. In this study we used several informative parameters characterizing the depositional environment, the type of source OM and its maturity. In the evaluation of the facial conditions of sedimentation and the degree of catagenetic conversion of the OM, the quantitative characteristics based not only on the distribution of steranes and terpanes, which are related to the lithology and maturity of the OM. New biomarkers parameters (carotenoids) were used to study the conditions of formation of shale strata. Based on these new data, a new model of geological and environmental conditions for the formation of shale strata saturated bituminous matter (organic matter).

New patterns of changes in these biomarkers were found: up the section of the sedimentary cover - from the crystalline basement to the Permian sediments of the East European platform. The report will be presented criteria for the application of biomarkers of organic matter to solve geological problems of oil prospecting and exploration.