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About Isotopic Composition of Oil and Bitumoids of the South-Tatarian Arch

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The area of study is located in the eastern part of the East European Platform. The territory of investigation is confined to the central portion of the Volga-Ural Antecline.
Within the last decade a number of scientific publications emphasizing a leading role of deep fluids in the genesis of hydrocarbons increased significantly. Among the evidences of participation of deep fluids in formation of oil accumulations are the results of geochemical studies. The long-term study of micro-elemental composition of oil suggests the presence of a wide range of metals in oil. Both the presence and composition of these metals could not be related to rocks of the sedimentary cover. For example, sometimes the abundances of volatile chalcophile and dispersed elements characteristic of basal and ultrabasic rocks (Hg, Au, Ag, Cu, Re, Se, As, et al.) are ten to hundred times higher than the Earth's crust Clarke values. Moreover, oil contains high-charge and high-ionic lithophilous elements (U, Th, REE, Zr et al.) characteristic of alkaline and ultra-alkaline rock complexes (Gottikh et al., 2008). In addition platinoids, among which palladium is predominating, are found in oil. Palladium is commonly predominating over the total of Ru+Ir+Rh. Interrelation between these components is controlling the geochemical classification of oil provinces by platinum metal specialization. The presence of chromium, cuprum, nickel and cobalt in oil in addition to platinoids is indicator of the chemical and metallogeny features of platform hyperbasites (Marakushev et al., 2004). Of much importance is the presence of a sharply defined positive europium anomaly in hondrite-normalized distribution of rare elements in oil that is unusual for host rocks, formation water and organic material (Vinokurov et al., 2000). Finally, the inconsistence of isotopic composition of neodymium and strontium enclosed by oil and the isotopic composition of bitumoids of probable oil source rocks is found (Gottikh et al., 2006). The Phanerozoic sedimentary deposits are often found to contain black shale formations and the zones of carbon metasomatism with the gold and platinum mineralisation and the isotopes that indicate the presence of the mantle components. Such formations are believed to be due to the deep dry reduced gas emissions into the upper crustal strata. Strontium isotopic ratios provide another piece of evidence that oil has no relation to the «producing» sedimentary material. Strontium isotopic systems and neodymium in petroleum and carbonic rocks were evolved in different ways, and naphthoids of the Melekes trough and the central part of the South Tatarstan Arch had different sources of microelements. Diagrams of eNd–87Sr/86Sr, used to identify the zones of magmatic accumulation in the crust, have shown that microelements found in petroleum might have their sources in magmas of varying composition, in active zones of the lower-crust substratum and in the mantle. Geochemical features of the mantle fluid relics sealed in diamonds and those of the oil-producing systems have been found to be fully identical. The fluids that affect the lithosphere extract microelements out of the matrix and take part in oil formation must have themselves been formed at a great depth at low fO2. Geophysical data have also confirmed that gas systems reached the upper mantle and earth's crust to undergo polymerization and polycondensation.