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Methods and results of regional geochemical prospecting of petroliferous deposits

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Regional geochemical works are conducted on the basis of multi-purpose geochemical mapping in scale 1:1 000 000 with the studies of adsorbed form of hydrocarbon gases (HCGads) in soils with superimposed litho-chemical haloes

The method using adsorbed hydrocarbon gases was developed by L.S. Kondratov [1986]. The gist of the method is in the fact that geochemical field above oil and gas deposits is enriched by heavy components. This enrichment is vividly noted in different conditions (in subsalt beds, under tectonic shields, in sea shelves, and others) even in the absence of marked anomalous accumulations of HCGads overlying deposits.

Positive contrasting anomalies of naphtha content coefficient (K_n) are of great importance for locating and assessing high-potential oil and gas areas. It is defined as the ratio between the product of anomalous character coefficients of five heavy HCGads (butene-1, n-butane, isobutene, n-pentane, isopentane) and the product of anomalous character coefficient of five light HCGads (methane, ethylene, ethane, propylene, propane).

On the basis of research data on all the areas under investigation, large oil and gas deposits are located within contrasting anomalous geochemical zones of K_n or in the immediate nearness to them. Smaller oil and gas deposits are for the major part located outside zones of contrasting anomalies of K_n including the zones of decreased values of K_n . For the major part, promising high-potential areas are characterized by $K_n > 4.0$, medium-potential areas are characterized by $K_n = 1.0 - 4.0$, low-potential areas have $K_n < 1.0$, that is the higher is K_n anomaly the greater is the potential of an area.

The applicability of criteria based on the content distribution of adsorbed non-hydrocarbon gases (CO_{2ads} , N_{2ads} , H_{2ads}) indexes of pH and Eh and microelements (J, TR, S, Ni, V, Zn, Mo and others) depends on the conditions of regions. In some territories, oil and gas areas are recorded by positive anomalies, in others they are marked by negative anomalies or some territories may be indifferent with respect to anomalies.

From data of regional geochemical works, several districts are located that are promising for finding new large oil and gas deposits in the Volga-Ural oil and gas province. New types of oil and gas sites are distinguished that are confined to West Ural fold-thrust belt and actually to Ural folded area. To improve predictive assessment and define location of exploration boreholes in outlined areas we recommend conducting geochemical works in scale 1:200 000 – 1:100 000.

