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Chemical diagenesis in near-surface zone above oil fields in geochemical exploration

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Abstract

Hydrocarbon microseepages result in chemical and mineralogical changes in the near-surface zone above oil reservoirs. The results of geochemical research within the three oil fields of the West Siberian Basin demonstrate that chemical diagenetic processes lead to an increased inhomogeneity in chemical element distribution in soils, subsoil atmosphere and snow. Pulse cathodoluminescence (PCL) study of soils and transmission electron microscopy (TEM) study of micro- and nanoparticles, collected from the subsoil atmosphere, showed that geochemical conditions over oil reservoirs were favorable for the enrichment of silicate and aluminosilicate minerals by chemical impurities. Chemical composition of micro- and nanoparticles of metal compounds, collected from within the vertical projection of the oil field outline, suggested that these compounds were formed under intense reductive conditions that are not characteristic for the hypergene zone.