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THE ROLE OF NUCLEUS REACTIONS IN PETROLEUM METAMORPHISM

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Many published scales reflect the irreversible effects of organic metamorphism. A.Hood, C.C.M.Gutjahr and R.L.Heacock refer to the process of thermal metamorphism of organic matter as "organic metamorphism' . It also has been called "transformation"(Dobryansky, 1963), metamorphism (Landes, 1966-67), "thermal alteration"(Henderson et al, 1968, Staplin, 1969) and subsequently many others described the process as a series of thermocatalytic reactions leading to products of lower free energy by degradation, leading to smaller molecules of increasing volatility, mobility and hydrogen content and condensation. For application to petroleum exploration problems, however, there has been a need for a single numerical scale that is applicable over the entire thermal range of interest in the generation and destruction petroleum [1, 2].

It was studied the hydrocarbon transformation by Yu.V.Larichev and O.N.Martyanov[3]. They presented the results of the in situ SAXS study of the asphaltene aggregate transformations due to dilution of several heavy crude oils by heptane within the time range from 5 min to 3 days. The main growth of the asphaltene aggregates was usually observed within the first minutes. The analysis of the SAXS data obtained in situ for the oils having significantly different relative content of resins showed their great influence on the dynamics of aggregates formation on a nanometer scale. In particular, it has been shown that the resins can prevent the asphaltene aggregation via a certain mechanism which usually leads to the high anisotropy of the aggregates. Therefore the relative content of resin and asphaltenes as well, as aromatics and aliphatic, lead to the asphaltene aggregates with different shapes and different density of deposits. It has been found that asphaltene could form secondary aggregates with different shapes (worm –like and micelle-like shapes) and the Shape of asphaltene aggregate and their evolution during the time are dependent on the resin content in the heavy crude oils.

The presented research work has been devoted the key role of nucleus reactions in petroleum metamorphism, that is transformation of hydrocarbons. As crude oil was used Gunasli oil from Azerbaijan. Investigations were carried out under the influence of gamma rays at room temperature. The samples were irradiated with gamma radiation from the 60Co isotope under static conditions, within vacuumed and then sealed quartz tubes at room temperature. The dose rate was 10.5 Rad/sec.

It was studied that petroleum's metamorphism process is a series of radio-catalytic reactions.

References

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