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CATALYSTS OF RADIO-CHEMICAL REACTIONS, CONNECTION WITH THE CONCEPTS OF THE ORIGIN OF PETROLEUM ON EARTH

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The catalytic properties of zeolites have been known since the late fifties of the twentieth century. Zeolites are crystalline substances with developed porosity. A number of work was devoted to formation and transformation of petroleum hydrocarbons in porous system [1-3]. The theory of the abiogenic deep origin of hydrocarbons recognizes that the petroleum is a primordial material of deep origin [Kutcherov, Krayushkin 2010]. The experimental results confirming the possibility of synthesis of natural gas from inorganic compounds under the upper mantle conditions were published in [Kutcherov et al.,2010]. Both donors of carbon (carbon itself, carbonates, CO2) and hydrogen(water, hydroxyl group of minerals) are present in the asphenosphere in sufficient amounts. Thermodynamically favourable reaction environment (reducing conditions) could be created by a presence of FeO. The presence of several present of FeO in basical and ultra-basical rocks of asthenosphere is documented [3]. It has been shown the reactions of the formation of petroleum's aromatics in presence of bentonite clay [2].

In this presented research, bentonite clay from Alpoid deposit, Azerbaijan was proposed as a catalyst for radiation-induced isomerization of petroleum hydrocarbons at low doses of gamma-radiation. Natural clays, which are a low-cost and scarce natural resource, are nontoxic to the ecosystem.

The raw bentonite clay sample used in these experiments has nanostructured composition with particle size in the range of 55≤ d [nm] ≤ 175 nm [2]. In the present work, the influence of gamma-irradiation (^{60}Co) on physicochemical parameters ("crystallinity", specific surface, cation exchange capacity, main layer charge) of clay minerals were investigated. The influence of gamma-irradiation on the physicochemical properties is generally weak at law doses. A reduction of lattice iron during irradiation could be measured, which causes decreasing values of cation exchange capacity (CEC) and main layer charge of the smectites. A weak loss of "crystallinity"of bentonite could be observed.

The regulation of active sites and adsorption properties, as well as the topology of support surfaces, allows a potential predictive design of novel catalysts for transformation of hydrocarbons. The main purposes of the study were set, which are discovering the role of catalyst for transformation maximum energy to the system. Hydrocarbons adsorbed on mineral solid of high surface area. The catalytic conversion of hydrocarbons of petroleum occurring on contact with irradiated solids. The main essence of radiocatalytic processes is transferring the unbalanced charges formed by absorbed ionizing radiation energy on the surface of the catalyst to the system.

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