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THE STUDY OF NUCLEUS REACTIONS IN GUNESHLI PETROLEUM BY EPR METHOD

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Crude oil is naturally occurring oil generated by geological and geochemical processes. Each type of crude oil or petroleum product has unique characteristics or properties [1]. These properties influence how petroleum will behave when it is exposed by gamma-rays with and without catalyst. The process of crude oil's hydrocarbon's radiolysis is complicated [2]. Over the past decade, it has been achieved a new level in understanding of the most important processes'mechanisms of hydrocarbon conversion.
The aim of this study was to investigate the changes of hydrocarbon generation on the surface of the catalyst, irradiated with gamma rays. The raw bentonite sample used in these experiments has nanostructured composition [2]. Due to such a structure, the applied catalyst supports maximum energy transfer to the system. One of the primary objectives of this research work is increasing the efficiency of transformation of adsorbed beam energy in solid phase to the system and improvement of formation of branched hydrocarbons in petroleum. The changes taking place in raw bentonite, under ionizing radiation, can be interpreted as involving the creation of a structure with radiation defects. It has been investigated the dynamics of dose–dependent changes in the amount of izostructural hydrocarbons and the main reason change of its form under radiation are the configuration, distortion of n-hydrocarbon structure of crude oil, the conformation, transformation and reorientation of some sections of petroleum molecules and weakening of intermodular interaction. By using the method of EPR spectroscopy has been discussed possible mechanism of radio-catalytic reaction for conversion of n-alkanes to branched hydrocarbons at low dose irradiation.
The crude oil samples were irradiated with gamma radiation from the ^{60}Co isotope under static conditions, within vacuum sealed quartz tubes at room temperature. The dose rate was 10.5 Rad/sec. Electron Paramagnetic Resonance (EPR) is used to study metal centers and radicals involved in chemical processes. Structural insights from the chemical structure to intermolecular interactions are obtained from EPR techniques ("Bruker"EMX MicroX) at room temperature. Parameters for signal measurement: microwave frequency 9.87 GHz, modulation frequency 100 kHz, modulation amplitude 5 G, sweep width 100G, measuring range 100 G. Taking into account that EPR is a non-destructive method and there is no need for sample preparation, it demonstrates that EPR can be used for the on-line monitoring or even for the EPR logging to follow the influence of thermal or radio-catalytic treatment of heavy crude oil.

References:

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