

EVIDENCE OF RADIOCATALYTIC ACTION IN GENERATION OF GUNASHLI PETROLEUM

The problem of determining the genesis of petroleum is essentially chemical in nature. An explanation must be given for the formation of large numbers of n-alkanes, branched alkanes, cycloparaffines, olefins and arenes from the original material throughout geologic history. Biodegradation of crude oil is evidence of early generation [1]. Oil generation commenced at the end of Pliocene and continues at present at depths between 6000 and 12,000 m [2].

The aim of this study was to investigate the changes of Gunashli petroleum generation on the surface of the catalyst, irradiated with gamma rays. The catalytic role of clay could be explained by facilitating the appearance of intermediate structures. It can be considered that in active status, the catalyst creates a structural availability so that the hydrocarbon molecules can penetrate its pores. Ionic species in the composition of clay acts as unsaturated hydrocarbons, facilitating noncovalent bonds to break under the action of nuclear radiation. Generated carbenium ions due to the acidity (H^+AlO_3) of bentonite take part in the transformation process of hydrocarbons [3]. The raw bentonite sample used in these experiments has nanostructured composition [3,4]. The changes taking place in raw bentonite, under ionizing radiation, can be interpreted as involving the creation of a structure with radiation defects. Sodium bentonite has a single water layer containing Na^+ as exchangeable ions (with swelling properties).

The water radiolysis process leads to formation the following primary products:

H_2O e-eq, H, HO, HO_2 , H_3O^+ , OH^- , H_2O_2 , H_2

It has been investigated the dynamics of dose -dependent changes in the amount of transformed hydrocarbons. By using the method of SEM, EDX, XRD and FT-IR, spectroscopy has been discussed possible mechanism of radiocatalytic transformation of hydrocarbons under gamma-irradiation in presence of Na-bentonite clay. The stable radiolysis product, H_2 , resulted in the above reactive systems, was determined quantitatively by gas-chromatography.

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.

References

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