

INVESTIGATION OF ELECTRO-HYDRAULIC EFFECT ON RHEOLOGICAL AND PHYSICO-CHEMICAL CHARACTERISTICS OF HIGH-VELOCITY OIL

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Today, the extraction and transportation of viscous, hard-to-recover oils is one of the urgent tasks in the oil-producing and oil-refining industries. Considering that the reserves of high-viscosity oils are five times higher than the volume of recoverable hydrocarbons of low and medium viscosity, interest in the problem of lowering oil viscosity is constantly growing. The high content of heavy hydrocarbons in high-viscosity oil causes it to freeze at room temperature after being removed from the well; when pumping such oil, hydraulic pressure increases on the main oil pipelines, paraffins and resins are deposited on the surface of the equipment being transported, leading to a sharp deterioration in its performance.

In order to improve the rheological characteristics of high-viscosity oil from the Karazhanbas field, the influence of electro-hydraulic action on it has been studied. It is shown that the decrease in dynamic viscosity, accompanied by the process of conversion of heavy fractions of oil into the lungs, begins with a fivefold exposure to electro-hydraulic shock. It was determined that for a quantitative course of the process of splitting hydrocarbons 20-25 pulses of electric discharge are enough. The effect of adding organic solvent on the rheological properties of oil has been investigated. It has been found that the addition of a solvent to highly viscous oil leads to an increase in the conversion of hydrocarbons under electro-hydraulic action. Using gas chromatography-mass spectrometry, a comparative study of the hydrocarbon composition of oil before and after electrohydraulic action was carried out. It was found that with the electrohydraulic processing of high-viscosity oil, the content of paraffins and naphthalenes in it slightly decreases. In petroleum hydrocarbons, a fragmentary composition was determined by ^1H and ^{13}C NMR spectroscopy methods before and after electrohydraulic action. It was revealed that in the oil after the electrohydraulic action, the share of protons of long alkyl terminal CH_3 -groups of hydrocarbons decreases, which indicates the process of decomposition of heavy oil fractions into light.