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Features of coupling between rheological properties of oil and natural bitumen and the self-diffusion data obtained by NMR method

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Abstract

This paper describes the features of translational characteristics of oil molecules by using nuclear magnetic resonance method with pulsed magnetic field gradient (gradient NMR). It is shown that the rheological properties of heavy oil samples (viscosity) do not completely correlate with the measurement of self-diffusion coefficient. It is caused by distribution of oil samples according to their molecular composition and molecular weight as well as their complex supramolecular organization. It is noted that the best agreement with the viscosity characteristics is achieved via the introduction of a new average coefficient, which is a weighted sum of the inverse of the partial self-diffusion coefficients.

Keywords

Nuclear magnetic resonance (NMR), Oil, Rheology, Self-diffusion, Viscosity