

High-frequency EPR study of crude oils

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Abstract

Four different samples of crude oil were studied by means of high-frequency W-band (94 GHz) electron paramagnetic resonance (EPR) spectroscopy with the aim to develop new methods of crude oil quality control. High spectral resolution of W-band allowed to avoid an overlap of spectra contributors. The ratio K between the integral intensity of the low-field EPR component of the vanadyl complexes to that of free radical line was chosen as an attribute of each sample. Using the K -parameters and EPR spectra simulations the crude oil leaking between adjacent horizons is shown. Pulsed EPR experiments allowed detecting free radicals signals only. It is demonstrated that the extracted transverse relaxation time could be used as an additional parameter which characterizes the origin of the crude oil and nature of the oil paramagnetic centers. © Published under licence by IOP Publishing Ltd.

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