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# Proton-Radical Interaction in Crude Oil - A Combined NMR and EPR Study

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## Abstract

© 2018 American Chemical Society. We present a detailed study of electron/nuclear interaction in a specific crude oil by continuous-wave and pulsed EPR, electron-nuclear double resonance (ENDOR) at W-band (94 GHz), and fast field-cycling dynamic nuclear polarization (FFC-DNP) at X-band. A perceptible non-Overhauser (solid) effect is found at room temperature as a result of the polarization transfer from the intrinsic oil "free" radicals to the  $^1\text{H}$  nuclei with different dynamics. On the basis of the analysis of the longitudinal nuclear relaxation times, three dynamical components described by different electron-proton coupling parameters were found, which in combination with ENDOR provides information about the distribution of the radicals in the high-molecular oil components.

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