A Low Field Fluorine-Electron Double Resonance Study for GALV and BDPA in Some Aliphatic and Aromatic Solvents

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Dynamic nuclear polarization experiments were performed to study the solutions of the stable free radicals Galvinoxyl and α,γ-Bisdiphenylene-β-phenyl allyl complex with benzene $(1:1)$ in some highly fluorinated aliphatic and aromatic solvents. The measurements were performed at four different temperatures to test the dipolar and the scalar part of the coupling between the fluorine nucleus (^{19}F) and the unpaired electron. It was found that in the samples with Galvinoxyl the dipolar interactions are more effective for the aromatic solvents, while the scalar interactions are more effective for the aliphatics. An alteration from negative to positive region for the nuclear-electron coupling parameter informing on scalar or dipole-dipole interaction was observed only for 2,2,3,4,4,4-Hexafluoro-1-butanol solvent with increasing temperature. The nuclear-electron coupling parameter varies between -0.003 and 0.228 in all aliphatic solvents and between 0.180 and 0.318 in aromatic solvents. Overhauser enhancement was not observed in the samples prepared with Hexadecafluoroheptane, Heptafluorobutyric acid, and Nonafluoropentanoic acid for both free radicals in all temperatures. These solvents may have scavenging effects on the radicals due to their behaviour.

Key words: Dynamic Nuclear Polarization; Fluorine-Electron Double Resonance; Oximetry; Free Radical; Free Radical Scavenger.