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The effect of isotopic labeling on 4-oxo-TEMPO free radical on ^{13}C dynamic nuclear polarization PETER NIEDBALSKI, ANDHIKA KISWANDHI, CHRISTOPHER PARISH, LLOYD LUMATA, University of Texas at Dallas — Dynamic nuclear polarization (DNP) is a physics technique that amplifies the nuclear magnetic resonance (NMR) signals by transferring the high polarization of the electrons to the nuclear spins. Thus, the choice of free radical is crucial in DNP as it can directly affect the NMR signal enhancement levels, typically on the on the order of several thousand-fold in the liquid-state. In this study, we investigate the efficiency of four variants of the well-known 4-oxo-TEMPO radical (normal 4-oxo-TEMPO plus its ^{15}N-enriched and/or perdeuterated variants) for use in DNP of an important metabolic tracer [1-^{13}C]acetate. Our findings indicate that, despite the differences seen in electron paramagnetic resonance (EPR) spectra, changing the composition of the TEMPO radical through deuteration or ^{15}N doping yields no significant difference in ^{13}C DNP efficiency at 3.35 T and 1.2 K. Deuteration of the solvent causes a significant increase of ^{13}C polarization that is consistent over all the 4-oxo-TEMPO variants. These findings are consistent with the thermal mixing model of DNP.

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