

**Frequency Dependent Study Of The Correlation Functions In  
EPR  
Spectroscopy - The Cole-Davidson Approach 1. Perdeuterated  
2,2,6,6-Tetramethyl-4-Piperidone N-Oxide In Toluene**

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**Summary**

EPR linewidth measurements of PD-Tempone in toluene at 1 (L-Band), 4 (S-Band), 9 (X-Band) and 34 GHz (Q-Band) microwave frequencies indicate the presence of a distribution of relaxation times. The empirical response parameter introduced by Cole-Davidson for the analysis of dielectric relaxation in liquids has been used for the analysis of EPR relaxation data in the low frequency region. The Cole-Davidson parameter can assume values in the range  $0 < \beta \leq 1$ . When  $\beta = 1$ , one obtains the Debye-type spectral density. The calculated linewidth data at 1 GHz agrees with a Cole-Davidson distribution function with a width parameter  $0.83 \pm 0.04$  for a spherical solute.  $\beta < 1$  at L-band suggests the presence of an asymmetrical distribution of relaxation times associated with different modes of relaxation mechanisms or internal molecular motions. This study shows EPR experiments at low microwave frequencies are more sensitive to the shape of the correlation function. (C) 2000 Elsevier Science B.V. All rights reserved.

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