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NMR of Paramagnetic Molecules: Applications to Metallobiomolecules and Models, Second Edition is a self-contained, comprehensive reference for chemists, physicists, and life scientists whose research involves paramagnetic compounds.

Solution and solid-state NMR of paramagnetic molecules Paramagnetism is a unique tool in chemistry for the investigation of materials and complex systems including supramolecular assemblies, especially in the presence of internal flexibility.

Part of the field of competence of NMR is represented by

molecules with unpaired electrons, which are called paramagnetic. The presence of unpaired electrons is at the same time a drawback (negative effect) and a precious source of information about structure and dynamics.

#### **Paramagnetic Effects in NMR**

NMR of Paramagnetic Molecules - 1st Edition - Elsevier NMR of Paramagnetic Molecules, Volume 2 - 2nd Edition

Paramagnetic Effects in NMR – Outline and Useful References • Relaxation by electron spins – distance mapping • Field induced orientation – RDC measurements • Pseudo-contact shifts – distance and angle data • "Solution NMR of Paramagnetic

Molecules" Bertini, Luchinat, Parigi, Elsevier, 2001

Paramagnetic Relaxation. Structural carbon atoms are black. The crevice in the molecule leaves room for a single water molecule (blue and green) to interact directly with the Gd +3 ion (inner sphere relaxation). Beyond this a second shell of other water molecules experience outer sphere relaxation.

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In a paramagnetic molecule, especially if it is not too large (large means long  $\tau$  r),  $\tau$  s usually dominates  $\tau$  c "  $\tau$  r ranges from 10-9 s (small protein) to 10-7 s (large for NMR)  $\tau$  s ranges from 10-13 s to 10-8 s; but values 10-13 to 10-10 most feasible for high-resolution NMR. Thus  $\tau$  r-1 <<  $\tau$  s-1 and  $\tau$  s dominates  $\tau$  c for metalloproteins.

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# Paramagnetic nuclear magnetic resonance spectroscopy

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NMR of Paramagnetic Molecules. International experts report the latest developments in NMR methodology as applied to strongly relaxed and shifted resonances, detail the theoretical aspects of paramagnetic shift and relaxation, and discuss the interpretive bases of these molecular properties in relation to the structure and function of various paramagnetic molecules.

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Description NMR of Paramagnetic Molecules: Principles and Applications is a compendium of papers that discusses the physical principles behind the technique of nuclear magnetic resonance, as well as, evaluates the scope and limitation of the applications of NMR in chemistry and biology.

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# Paramagnetic nuclear magnetic resonance spectroscopy

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NMR spectroscopy at natural abundance. the NMR spectra of paramagnetic x-complexes. This has allowed the resolution of the signal splitting of Cp deuterons of 1 and 5 which could not be observed earlier in the 'H NMR spectra. and large (2-4) signal splittings is discussed and related to an extended Huckel calculation.

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