^{63}Cu Nuclear Magnetic Resonance and Viscosity Studies of Copper (I) Perchlorate in Mixed Solvents Containing Acetonitrile

Dip Singh Gill[a], Lindsay Byrne, and Terry I. Quickenden

Department of Chemistry, University of Western Australia, Nedlands, Western Australia-6907, Australia
[a] Department of Chemistry, Panjab University, Chandigarh-160014, India

Z. Naturforsch. **53a**, 1004–1008 (1998); received October 26, 1998

^{63}Cu nuclear magnetic resonance and viscosity studies of 0.064 M copper (I) perchlorate solutions have been made at 298 K in binary mixtures of acetonitrile (AN) with dimethylsulphoxide (DMSO), hexamethylphosphotriamide (HMPA), N,N-dimethylacetamide (DMA), nitromethane (NM), propylene carbonate (PC) and 3-hydroxypropionitrile (3 HPN) at several compositions of the mixtures using a 500 MHz NMR Spectrometer and Ubbelohde viscometer, respectively. The chemical shift (δ), linewidth (Δ) and line intensity (I) of the ^{63}Cu NMR signal in these mixed solvents have been measured relative to the ^{63}Cu signal in 0.064 M copper (I) perchlorate ($CuClO_4$) solution in pure AN. The quadrupolar relaxation rates $(1/T_2)_Q$, reorientational correlation times (τ_R) and quadrupolar coupling constants (QCC) of the copper (I) solvates have also been estimated from the data. The QCC values show a big variation in all solvent systems with the change of solvent composition, indicating the formation of mixed complexes. The variation of all NMR parameters with solvent composition shows strong effects of DMSO, HMPA, and DMA on the solvation behaviour of Cu^+ in the first three mixtures, and relatively much weaker effects of PC, NM and 3HPN in the other three mixtures.

Reprint requests to Prof. D. S. Gill. Fax: 91-172-545459