

Broadband Dielectric Response of the Ionic Liquid N-Methyl-N-Ethylpyrrolidinium Dicyanamide

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Dielectric relaxation spectra have been recorded over a broad frequency range ($\sim 0.1 \leq \nu/\text{GHz} \leq 20$) for the room temperature ionic liquid N-methyl-N-ethylpyrrolidinium dicyanamide. The major process, at ~ 7 GHz, is complex but appears to involve cooperative relaxation of the IL network similar to those observed for strongly H-bonded liquids. Its relaxation time shows Arrhenius behaviour as a function of temperature, with an activation energy of 18.6 kJ/mol. The dielectric constant ϵ was found to be 14.0 ± 0.3 decreasing exponentially over the temperature range 15 - 55 °C. Dielectric measurements of the IL in the weakly coordinating solvent dichloromethane showed that the cooperative relaxation persisted until at relatively high dilutions evidence of smaller ionic aggregates at ~ 1.2 GHz was observed.