^{1}H NMR Study of Ionic Motions in High Temperature Solid Phases of $(CH_3NH_3)_2ZnCl_4$

Hiroyuki Ishida

Department of Chemistry, Faculty of Science, Okayama University, Okayama 700-8530, Japan

Reprint requests to Prof. Dr. H. I.; E-mail: ishidah@cc.okayama-u.ac.jp

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The reorientation of the tetrahedral complex anion $ZnCl_4^{2-}$ and the self-diffusion of the cation in $(CH_3NH_3)_2ZnCl_4$ were studied by ^{1}H NMR spin-lattice relaxation time (^{1}H T_1) experiments. In the second highest-temperature phase, the temperature dependence of ^{1}H T_1 observed at 8.5 MHz could be explained by a magnetic dipolar-electric quadrupolar cross relaxation between ^{1}H and chlorine nuclei, and the activation energy of the anion motion was determined to be 105 kJ mol^{-1}. In the highest-temperature phase, the activation energy of the self-diffusion of the cation was determined to be 58 kJ mol^{-1} from the temperature and frequency dependence of ^{1}H T_1.

Key words: Nuclear Magnetic Resonance; Molecular Motion; Cross Relaxation; $(CH_3NH_3)_2ZnCl_4$.