Dynamic Behavior of Group 13 Elements in Bromocomplexes as Studied by NQR and NMR

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NMR, NQR, powder X-ray diffraction, DTA and AC conductivity were measured in $RMBr_4$ (R = Ag, Cu; M = Al, Ga) and RM_2Br_7 (R = Li, Ag; M = Al, Ga). In $RMBr_4$, the activation energy of Cu^+ diffusion was evaluated from ^{63}Cu NMR and was in good agreement with that from ^{81}Br NQR. In $CuAlBr_4$, the e^2Qq/h value of ^{63}Cu NMR and the η value of ^{27}Al NMR changed linearly with decreasing temperature, although the e^2Qq/h value of ^{27}Al NMR did not change so much. These temperature dependences are supposed to be due to Cu^+ diffusion and not to a variation of the lattice constants. In RM_2Br_7, the activation energy was obtained from the spin-lattice relaxation time T_1 of ^{81}Br NQR and is ascribed to a modulation of the cation diffusion. The line width of ^{7}Li NMR in $LiAl_2Br_7$ was about 5.9 kHz in the low-temperature phase and 0.4 kHz for the high-temperature phase. The ^{27}Al NMR spectrum was broadened by the quadrupole interaction and unchanged up to 400 K, suggesting that diffusion of Li^+ ions occurs in the high-temperature phase.

Key words: T_1 of ^{81}Br NQR; ^{27}Al NMR; ^{7}Li NMR; ^{63}Cu NMR; Cation Diffusion.