FOURIER TRANSFORM MICROWAVE SPECTRA OF Ne-$(CH_3)_2O$ AND Ar–$(CH_3)_2O$

YOSHIYUKI KAWASHIMA AND YASUMASA MORITA, *Department of Applied Chemistry, Kanagawa Institute of Technology, Atsugi, Kanagawa 243-0292, JAPAN*; NOBUKIMI OHASHI, *Department of Physics, Kanazawa University, Kanazawa 920-1129, JAPAN*; EIZI HIROTA, *The Graduate University for Advanced Studies, Hayama, Kanagawa 240-0193, JAPAN*.

In order to understand the dynamical behavior of van der Waals complexes and to obtain information on the potential function for internal motions, we have investigated Ne-dimethylether (Ne-DME) and Ar-dimethylether (Ar-DME) as simple examples of complexes with C_2v symmetry. The microwave spectra of both complexes were already studied by Caminati *et al.*[ab], but they observed and analyzed only *c*-type transitions between symmetric and antisymmetric inversion states, thereby evaluating the energy difference between the states to be 810 and 1 MHz for Ne-DME and Ar-DME, respectively. We have extended the observations for both complexes by using Fourier transform microwave spectrometer in the frequency region from 5 to 24 GHz. For Ne-DME, 18 *a*-type and 18 *c*-type transitions were observed split into two components, with the splittings ranging from 1 to 70 MHz and from 1300 to 1800 MHz, respectively. The *c*-type transitions were found as triplets with small splittings, which were ascribed to the internal rotation of the two methyl groups of DME. For Ar-DME, 36 *a*-type and 22 *c*-type transitions were detected, and some of them showed further small splittings due to the internal rotation of the methyl groups. We have analyzed all the transitions of the two states simultaneously, by using a Hamiltonian with Coriolis interaction terms included and also Hougen-Ohashi's Hamiltonian[c], and have derived molecular parameters much improved in precision than those previously reported.

[a] A. Maris and W. Caminati, J. Chem. Phys. 118, 1649 (2003).
[b] P. Ottaviani, A. Maris, W. Caminati, Y. Tatamitani, Y. Suzuki, T. Ogata, and J. L. Alonso, Chem. Phys. Lett. 361, 341 (2002).
[c] N. Ohashi and J. T. Hougen, J. Mol. Spectrosc. 163, 86 (1994).