

## ROTATIONAL SPECTRUM AND INTERNAL DYNAMICS OF THE Ne-H<sub>2</sub>S VAN DER WAALS COMPLEX

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Rotational spectra of several isotopomers of the Ne-H<sub>2</sub>S van der Waals dimer were measured in the frequency range from 4 to 22 GHz, using a pulsed molecular beam Fourier transform microwave spectrometer. Two  $K=0$  progressions were recorded for the symmetrical isotopomers (with H<sub>2</sub>S/D<sub>2</sub>S). This doubling is attributed to an internal rotation motion of the H<sub>2</sub>S moiety within the complex. The two states can be correlated to the 0<sub>00</sub> and 1<sub>01</sub> internal rotor states of free H<sub>2</sub>S and D<sub>2</sub>S. Only one  $K=0$  progression was measured for Ne-DSH. The excited internal rotor state is no longer metastable since the symmetry constraints no longer apply. An anomalous isotope effect observed in Ar-H<sub>2</sub>S, where the substitution of hydrogen by deuterium causes an increase in the ground state  $B$  rotational constant,<sup>a</sup> was not observed here, in agreement with the *ab initio* study by Dykstra and co-workers.<sup>b</sup> Nuclear quadrupole hyperfine structure was resolved or partially resolved for isotopomers containing <sup>33</sup>S and D, respectively, and the corresponding quadrupole coupling constants were determined. These were used to derive information about the intermolecular dynamics. The results are compared with those of Ar-H<sub>2</sub>S and Ar-H<sub>2</sub>O.

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<sup>a</sup>H. S. Gutowsky, T. Emilsson, and E. Arunan, *J. Chem. Phys.* **106**, 5309 (1997).

<sup>b</sup>G. de Oliveria and C. Dykstra, *J. Chem. Phys.* **110**, 289 (1999).