

## MICROWAVE SPECTRUM AND STRUCTURE OF A POLAR DIMER OF N<sub>2</sub>O

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Cavity Fourier-Transform microwave spectroscopy has been used to characterise a gas phase, polar dimer of N<sub>2</sub>O. The polar (N<sub>2</sub>O)<sub>2</sub> unit is generated by co-expansion of a gas sample containing a small percentage of N<sub>2</sub>O in a helium backing gas. Transitions in the pure rotational spectra of (<sup>15</sup>N<sub>2</sub>O)<sub>2</sub>, (<sup>14</sup>N<sup>15</sup>NO)(<sup>15</sup>N<sub>2</sub>O), (<sup>14</sup>N<sub>2</sub>O)(<sup>15</sup>N<sub>2</sub>O) and (<sup>14</sup>N<sub>2</sub>O)<sub>2</sub> are reported. The measured transitions of (<sup>15</sup>N<sub>2</sub>O)<sub>2</sub> and (<sup>14</sup>N<sup>15</sup>NO)(<sup>15</sup>N<sub>2</sub>O) are assigned and fitted to Hamiltonians allowing rotational, centrifugal distortion and <sup>14</sup>N nuclear quadrupole coupling constants to be determined. Hyperfine structure is assigned for a single  $J'_{K'-1, K'+1} \rightarrow J''_{K'-1, K'+1}$  transition of both isotopomers of (<sup>14</sup>N<sub>2</sub>O)(<sup>15</sup>N<sub>2</sub>O). Nuclear quadrupole coupling constants,  $\chi_{bb}$ , are reported for all four <sup>14</sup>N nuclei. The measured  $\chi_{bb}$  are in excellent agreement with those structures predicted from the measured rotational constants. The geometry of the molecule is slipped-parallel. The separation between the central nitrogen nuclei of the monomers in the  $r_m^{(1)}$  structure is 3.570(12)Å with the two N<sub>2</sub>O monomers respectively oriented 54.69(68)° and 49.85(64)° to the *a*-inertial axis. Simulation of hyperfine structure in the spectrum of the (<sup>14</sup>N<sub>2</sub>O)<sub>2</sub> isotopomer yields good qualitative agreement with experiment.