MICROWAVE SPECTRA OF THE Ar_3-NH_3 AND Ne_3-NH_3 VAN DER WAALS TETRAMERS

JENNIFER VAN WIJNGAARDEN and WOLFGANG JÄGER, *Department of Chemistry, University of Alberta, Edmonton, AB, Canada, T6G 2G2*.

Rotational spectra of the Ar_3-NH_3 and Ne_3-NH_3 van der Waals complexes were measured between 4 and 18 GHz using a pulsed jet Fourier transform microwave spectrometer. The isotopomers studied include those of NH_3, $^{15}NH_3$, ND_3, ND_2H, and NDH_2 in combination with Ar_3, $^{20}Ne_3$, $^{22}Ne_3$, $^{20}Ne_2{}^{22}Ne$, and $^{20}Ne^{22}Ne_2$. The isotopomers containing Ar_3, $^{20}Ne_3$, and $^{22}Ne_3$ are symmetric tops for which a-type transitions with K=3n (n=0,1,2,...) were observed. The other isotopomers are asymmetric tops and due to the reduced symmetry, all rotational levels are present in these complexes. For $^{20}Ne_2{}^{22}Ne$, both a- and b-type transitions were observed whereas the slightly different mass distribution in $^{20}Ne_2{}^{22}Ne$ led to the detection of a- and c- type transitions. For the deuterium containing isotopomers, each rotational transition is split by the inversion motion of ammonia within the complex. This inverison splitting is not observed in the NH_3 and $^{15}NH_3$ containing species for spin statistical reasons. The spectroscopic constants, including the ^{14}N nuclear quadrupole coupling constants, were fit for each isotopomer and used to derive structural and dynamical information for the Ar_3-NH_3 and Ne_3-NH_3 van der Waals complexes.