MICROWAVE SPECTRA AND NUCLEAR QUADRUPOLE COUPLING IN $F_3B\text{-}N(CH_3)_3$ AND $(CH_3)_3B\text{-}N(CH_3)_3$

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The donor-acceptor complexes $F_3B\text{-}N(CH_3)_3$ and $(CH_3)_3B\text{-}N(CH_3)_3$ have been studied by Fourier transform microwave spectroscopy. The rotational constants for both species are consistent with the literature values. For $F_3B\text{-}N(CH_3)_3$, the J = 0 - 1 and 1 - 2 transitions have been fully analyzed for the ^{10}B, ^{11}B, ^{14}N and ^{15}N species. A single state is observed, with no evidence of internal rotation. For $(CH_3)_3B\text{-}N(CH_3)_3$, the 0-1 and 1-2 transitions have been recorded and analyzed. In this case, two states are observed, with an intensity ratio of about 10:1. For both systems, a Townes and Dailey analysis of the ^{14}N nuclear quadrupole coupling constants has been used to provide information about the electronic structure of the complexes. In the case of $F_3B\text{-}N(CH_3)_3$, about 0.6 electrons are transferred from the trimethylamine to the BF_3 upon formation of the donor-acceptor bond, while for $(CH_3)_3B\text{-}N(CH_3)_3$ a value of 0.42 electrons is obtained. These results will be compared with similar measurements for related adducts of ammonia and trimethylamine.