

## MICROWAVE SPECTRUM OF THE HNO<sub>3</sub>-HCOOH COMPLEX

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The interconversion between two equivalent configurations of a system via exchange of protons is an important process with implications in areas ranging from chemical dynamics to molecular biology. In this work, we present microwave spectroscopic results and *ab initio* calculations on the doubly hydrogen bonded complex HNO<sub>3</sub>-HCOOH. Spectra of seven isotopologues of the system confirm a doubly hydrogen bonded geometry, analogous to that of the well studied carboxylic dimers. Unlike most carboxylic acid dimers, however, the two hydrogen bond lengths (and their associated heavy atom distances) are substantially different, causing the double proton transfer process to be accompanied by significant heavy atom motion. Splittings in the a-type rotational spectrum are observed but disappear for HNO<sub>3</sub>-HCOOD, indicating a tunneling motion of protons across the hydrogen bonds. *Ab initio* calculations of the binding energy and intermolecular potential surface are compared with those on the more thoroughly studied carboxylic dimers and the role of heavy atom motion is discussed. Spectroscopic constants provide accurate structural information and quantify the degree to which the electronic structure of the HNO<sub>3</sub> is altered upon complexation.