ROTATIONAL SPECTROSCOPY OF PEROXYNITRIC ACID

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Peroxynitric acid (PNA), $HOONO_2$, plays an important role in stratospheric ozone chemistry and has been observed in the atmosphere[a]. Due to low lying vibrational modes, the NO_2 and OH torsions, many vibrational states are thermally populated, leading to a complex pure rotational spectrum and significant hot-band contributions in the infrared[b]. We report an extention of the previous measurements and analyses of the ground and first excited vibrational states[c] into the millimeter- and submillimeter region (140-370 GHz) using the fast-scan spectrometer (FASSST). PNA is a non-planar, asymmetric prolate rotor with a- and b-type pure rotational transitions and c-type tunneling transitions between OH inversion states. Coriolis interactions between the inversion states cause perturbations in the spectrum. The analyses of the ground and first vibrational states fit the observed spectrum to experimental accuracy and extension to higher frequencies should be straightforward. In addition to the measurements of these states, we have also identified transitions in the next two highest vibrational states. The measurements and corresponding analyses in these states are currently limited to low K_a transitions and appear to be effected by perturbations between vibrational states. The spectrum and current analyses of each state will be discussed.

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