ANALYSIS OF COMBINED MILLIMETER-WAVE AND FOURIER TRANSFORM INFRARED SPECTRA OF DN_3: EXTENSION OF THE ANALYSIS TO EIGHT NEW VIBRATIONAL STATES

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We present a combined millimeter-wave and high-resolution infrared (FTIR) analysis of the the spectra of DN_3. We have observed the infrared spectrum of DN_3 at a resolution of 0.0009 cm^{-1} using the synchrotron at the Canadian Light Source between 30 and 5000 cm^{-1} at several pressures between 1 and 100 mTorr. We have also measured the millimeter-wave spectrum of DN_3 at Wisconsin and at Prague, covering a frequency range from 130 to 730 GHz. Using classical linear least-squares fitting and combination differences, we have assigned the spectra for the ground state and 15 lowest-energy vibrationally excited states (including 8 not previously studied). The latter include the four combination states of either ν_3 or ν_4 with either ν_5 or ν_6 and the tetrad of states involving three quanta of ν_5 and ν_6. In fact, all sixteen of these vibrational states are a complex polyad coupled by Coriolis, Darling-Dennison, and Fermi interactions that strongly perturb the observed transition frequencies. We are working toward combining all of this spectral data to achieve a global sixteen-state fit using SPFIT.