MEASUREMENTS OF THE ν_2 BAND OF HCN BROADENED BY N_2 AT LOW TEMPERATURES

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Features belonging to the ν_2 band system of hydrogen cyanide (HCN) appear prominently in thermal infrared spectra of the atmosphere of Saturn's moon Titan. To provide improved spectroscopic parameters for interpretation of Titan data, we have conducted laboratory studies of the temperature-dependence of the spectrum of HCN broadened by nitrogen (N_2) in the 14 μm region. Spectra of HCN-N_2 mixtures at temperatures between 211 and 300 K and pressures from about 0.02 to 0.96 atm were recorded at high resolution ($\sim$0.005 cm^{-1} using two Fourier transform spectrometers (FTS), the McMath-Pierce FTS at the National Solar Observatory on Kitt Peak and the Bruker IFS 120 HR FTS at the Pacific Northwest National Laboratory. A multispectrum nonlinear least squares technique[a] was used to fit selected intervals of 17 to 30 spectra simultaneously to obtain line broadening and shift parameters and their temperature dependences. The present study is the first to experimentally determine line mixing parameters in HCN Q branches. Line positions and intensities were also retrieved. The spectroscopic parameters resulting from the present study are compared to the results of other laboratory studies of HCN.
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[a] D. Chris Benner et al., *JQSRT* **53**, 705-721 (1995).