ANALYSIS OF SELF-BROADENED SPECTRA IN THE ν_5 AND ν_6 FUNDAMENTAL BANDS OF $^{12}CH_3D$

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A multispectrum nonlinear least-squares fitting technique[a] has been applied to determine accurate line center positions, absolute line intensities, Lorentz self-broadening ceofficients and self-induced pressure-shift coefficients for a large number of transitions in the two perpendicular fundamental bands of $^{12}CH_3D$ near 1160 and 1470 cm^{-1}. We analyzed together high-resolution room temperature absorption spectra recorded with two Fourier transform spectrometers (FTS). Three spectra were recorded using the Bruker IFS 120 HR at PNNL at 0.002 cm^{-1} resolution, and fourteen spectra were obtained with the McMath-Pierce FTS (0.006 cm^{-1} resolution) at the National Solar Observatory on Kitt Peak.

Self-broadening coefficients for over 1000 transitions and self-shift coefficients for more than 800 transitions were determined. The measurements include transitions with rotational quantum numbers over $J'' = 15$ and $K'' = 15$ and some forbidden transitions. Measurements were made in all sub-bands (^PP, ^PQ, ^PR, ^RP, ^RQ and ^RR). The measured broadening coefficients vary from 0.040 to 0.096 cm^{-1} atm^{-1} at 296K. Self-shift coefficients vary from about -0.014 to +0.004 cm^{-1} atm^{-1}. Less than 5% of the measured shift coefficients are positive, and majority of these positive shifts are associated with the $J'' = K''$ transitions in the ^PQ sub-bands. The values for the two perpendicular bands are compared and discussed.

[a]D. Chris Benner, C. P. Rinsland, V. Malathy Devi, M. A. H. Smith, and D. Atkins, *JQSRT* **53**, 705-721 (1995).