SELF- AND CO_2-BROADENED LINE SHAPE PARAMETERS FOR THE ν_2 AND ν_3 BANDS OF HDO

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Knowledge of CO_2-broadened HDO widths and their temperature dependence exponents are required to interpret atmospheric spectra of Mars and Venus. We therefore used nine high-resolution, high signal-to-noise spectra of HDO and HDO+CO_2 mixtures to obtain broadening coefficients for selected transitions of the ν_2 and ν_3 vibrational bands located at 7.13 and 2.70 μm, respectively. The gas samples were prepared by mixing equal amounts of high-purity distilled H_2O and a 99% enriched D_2O sample. Spectra at different temperatures (255-296 K) were obtained using a 20.38 cm long coolable cell[a] installed in the sample compartment of the Bruker 125HR Fourier transform spectrometer at the Jet Propulsion Laboratory, in Pasadena, CA. The retrieved parameters included accurate line positions, intensities, self- and CO_2-broadened half-width and pressure-shift coefficients and the temperature dependences of CO_2 broadened HDO. The spectroscopic parameters for many transitions were obtained simultaneously by multispectrum fitting[b] of all nine spectra in each band. A non-Voigt line shape with speed dependence was applied. Line mixing was also observed for several transition pairs. Preliminary results will be compared to other recent measurements reported in the literature.[c]

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[a] K. Sung, A.W. Mantz, M.A.H. Smith, L.R. Brown, T.J. Crawford, V.M. Devi, D.C. Benner. J. Mol. Spectrosc. 162 (2010) 124-134.

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

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