

SPECTRAL LINE SHAPE PARAMETERS FOR THE ν_1 , ν_2 , and ν_3 BANDS OF HDO: SELF AND CO₂ BROADENED

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To provide precise information relevant to Martian atmospheric remote sensing, high resolution high signal-to-noise ratio spectra of HDO in mixture with CO₂ were recorded in the ν_1 , ν_2 , and ν_3 fundamental bands between 2.7 and 7 μm regions. The spectra were obtained with the Bruker IFS-125HR Fourier transform spectrometer at the Jet Propulsion Laboratory along with two specially built coolable absorption cells with path lengths of 0.2038 m^a and 20.941 m^b at various sample gas temperatures ($\sim 220 - 296$ K), total sample pressures and volume mixing ratios. A multispectrum nonlinear least squares technique^c was applied to fit simultaneously all the spectra obtained. The measured line parameters include accurate line positions, intensities, self- and CO₂-broadened Lorentz halfwidth and pressure-shift coefficients, and temperature dependences of CO₂ broadened HDO halfwidth and pressure-shift coefficients. Line mixing coefficients using the relaxation matrix formalism and quadratic speed dependence parameters were also measured where appropriate. Example results for select transitions in each band will be presented and comparisons made to other measured/calculated values^d.

^aK. 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.

^bA.W. Mantz, K. Sung, T.J. Crawford, L.R. Brown, M.A.H. Smith, V.M. Devi, D.C. Benner, *J. Mol. Spectrosc.* 304 (2014) 12-24.

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

^dResearch described in this paper are performed at the College of William and Mary, Jet Propulsion Laboratory, California Institute of Technology, Connecticut College, and NASA Langley Research Center under contracts and cooperative agreements with the National Aeronautics and Space Administration. RRG and CLR were supported by the National Science Foundation through Grant # AGS-1156862.