MEASUREMENTS of BAND INTENSITIES, HERMAN-WALLIS PARAMETERS, and SELF-BROADENING LINE-WIDTHS of the 30011+00001 and 30014←00001 BANDS of C02 at 6503 cm⁻¹ and 6076 cm⁻¹. L. P. Giver, L. R. Brown, R. B. Wattson, M. N. Spencer, and C. Chackerian, Jr.

Rotationless band intensities and Herman-Wallis parameters are listed in HITRAN tabulations (Rothman, et al./ J. Q. S.R.T. 48, 537, 1992) for several hundred CO2 overtone-combination bands. These parameters are based on laboratory measurements when available, and on DND calculations for the unmeasured bands. The DND calculations for the Fermi interacting nν1+ν3 polyads show the a2Herman-Wallis parameter varying smoothly from a negative value for the first member of the polyad to a positive value for the final member. Johns' (J. Mol. Spec. 134, 433, 1989) measurements of the ν1+ν3 dyad are consistent with the DND calculations for the a2 parameter, as are our recent measurements (submitted to J. Mol. Spec.) of the 4ν1+ν3 pentad. However, the measurement-based values in the HITRAN tables for the 2ν1+ν3 triad and the 3ν1+ν3 tetrad do not support the DND calculated values for the a2 parameters. We therefore decided to make new measurements to improve some of these intensity parameters.

With the McMath FTS at Kitt Peak National Observatory/National Solar Observatory we recorded several spectra of the 4000 to 8000 cm⁻¹ region of pure CO2 at 0.011 cm⁻¹ resolution using the 6 meter White absorption cell. The signal/noise and absorbance of the first and fourth bands of the 3ν1+ν3 tetrad of 12C16O2 were ideal on these spectra for measuring line intensities and broadening widths. Our self-broadening results agree with the HITRAN parameterization, while our measurements of the rotationless band intensities are about 15% less than the HITRAN values. We find a negative value of a2 for the 30011 ←00001 band and a positive value for the 30014-00001 band, whereas the HITRAN values of a2 for all four tetrad bands. Our a1 and a2 Herman-Wallis parameters are closer to DND calculated values than the 1992 HITRAN values for both the 30011 ←00001 and the 30014-00001 band.

Part of the research reported in this paper was performed at the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration.

Address of Giver, Spencer, and Chackerian: NASA Ames Research Center, Moffett Field, CA 94035-1000. Address of Brown: Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109. Address of Wattson: Stewart Radiance Laboratory, Utah State University, Bedford, MA 01730.

Time required: 10 min.

Session in which paper is recommended for presentation: 4: Infrared Experimental.