PRESSURE BROADENING AND SHIFT COEFFICIENTS IN THE $2\nu_2^0$ and ν_1 BANDS OF $^{16}O^{13}C^{18}O$

V. MALATHY DEVI, D. CHRIS BENNER, *Department of Physics, The College of William and Mary, Williamsburg, VA 23187-8795*; M. A. H. SMITH and C. P. RINSLAND, *Atmospheric Sciences Division, NASA Langley Research Center, Mail Stop 401A, Hampton, VA 23681-0001*.

The vibration-rotation spectrum of a 90% ^{13}C-enriched sample of carbon dioxide has been studied at 0.0027 cm^{-1} resolution using the McMath-Pierce Fourier transform spectrometer. The data were obtained in the 800 to 1400 cm^{-1} spectral region, covering the $^{13}C^{16}O_2$ laser bands as well as the $2\nu_2^0$ and ν_1 bands of $^{16}O^{13}C^{18}O$. In this study we report the first measurements of the pressure broadening and the pressure-induced shift coefficients due to air and nitrogen for 93 rovibrational lines, P(46) to R(46) and P(50) to R(45), respectively in the $2\nu_2^0$ and ν_1 bands of $^{16}O^{13}C^{18}O$. The results were obtained by analyzing 10 long path, room temperature laboratory absorption spectra using a multispectrum nonlinear least-squares fitting technique.[a] The air-broadening coefficients obtained in this study agreed well with those reported for the 29 $2\nu_2^0$ and 64 ν_1 band lines in the HITRAN compilation.[b] Broadening by nitrogen was about 4% larger than that of air. Similar to broadening coefficients, the pressure shift coefficients were also found to be transition dependent; but different for the P- and R-branch lines with same J value. Except for a few R branch lines, the measured shift coefficients were negative and varied from $+4x10^{-3}$ cm^{-1} atm^{-1} at 296 K to $-5.6x10^{-3}$ cm^{-1} atm^{-1} at 296 K. Comparisons of the broadening and shift coefficients between the two bands, between the P and R branches, and between the broadening gases were made. No significant difference between shift coefficients of the two bands or the two gases was observed. The results obtained were compared with values previously reported in the literature.

---

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

[b] L. S. Rothman, R. R. Gamache, R. H. Tipping, C. P. Rinsland, M. A. H. Smith, D. C. Benner, V. Malathy Devi, J.-M. Flaud, C. Camy-Peyret, A. Perrin, A. Goldman, S. T. Massie, L. R. Brown, and R. A. Toth, *JQSRT* **48**, 469-507 (1992); L. S. Rothman *et al.*, in preparation, (1997).