INTENSITIES, COLLISION-BROADENED HALF-WIDTHS, AND COLLISION-INDUCED LINE SHIFTS IN THE FUNDAMENTAL AND OVERTONE BANDS OF $^{12}C^{16}O$ RELEVANT TO THE TERRESTRIAL AND JOVIAN ATMOSPHERES

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Absolute intensities, self-broadened, air-broadened and H_2-broadened half-widths, and self-induced, air-induced and H_2-induced line shifts were measured in the second overtone (3-0) band of $^{12}C^{16}O$ at 296 K using a Fourier-transform spectrometer and a multi-spectral-line-fitting technique. The absolute intensity of the band was determined to be $(4.62 \pm 0.06) \times 10^{-22}$ cm $\cdot$ molecule^{-1}. The square of the transition moment, $|\mu_0|^2$, of this band was deduced to be $(1.712 \pm 0.004) \times 10^{-7} Debye^2$. The two Herman-Wallis factors are estimated to be C = $(1.185 \pm 0.009) \times 10^{-2}$ and D = $(1.014 \pm 0.069) \times 10^{-4}$. H_2-broadened half-widths and H_2-induced line shifts in the (1-0) and (2-0) bands of $^{12}C^{16}O$ were measured at several temperatures between 83 and 302 K relevant to Jovian planets.
CO_2-broadened half-widths and CO_2-induced line shifts in the fundamental band of $^{12}C^{16}O$ were also measured at 202, 245 and 300 K. Self- and air-broadened line widths decrease with m, where m is $-J$ for P-branch and J+1 for R-branch. However, H_2-broadened line widths, whose values of the lines in the fundamental band were found to be in excellent agreement with those reported by Varanasi et al (1987), exhibit no significant dependence on m for all the bands measured. While the line widths in the CO (3-0) band measured at the room temperature were nearly the same as those in the 1-0 and 2-0 bands in the self- and air-broadening studied, the collision-induced line shifts were found to be much larger in the 3-0 band. This was also true of H_2-broadened spectra. Each mean value of n and ξ, the exponents describing temperature dependence, are determined to be 0.65 for H_2-broadened line widths and 1.00 for H_2-induced-induced line shifts both in the fundamental and the first overtone band.