PRESSURE BROADENING IN THE $^{13}$C$^{16}$O 2–0 BAND

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$\text{N}_2$ induced pressure broadening in the $^{13}$C$^{16}$O 2–0 band around 4167 cm$^{-1}$ was investigated using Fourier Transform Spectroscopy. The spectra were recorded with a sample of 99% isotopically pure $^{13}$CO in a White-type absorption cell at a resolution of 0.005 cm$^{-1}$. Voigt profiles convolved with the FTS apparatus function were fitted to the observed lineshapes$^a$, and Lorentzian HWHM were determined as function of $\text{N}_2$ pressure. Pressure broadening coefficients for $m$ between $-33$ and $+34$ were obtained with uncertainties of 5.8%.$^b$. The results are compared to $\text{N}_2$ broadening coefficients obtained from simultaneous measurements in the 2–0 band of $^{12}$C$^{16}$O. While the latter values agree well with those published earlier, those of $^{13}$C$^{16}$O are systematically lower by 5–7% compared to $^{12}$C$^{16}$O. This indicates that in spectroscopic databases the pressure broadening of $^{13}$C$^{16}$O is significantly overestimated. This is most important since recent work$^c$ shows that the $^{13}$CO/$^{12}$CO mixing ratio is an indicator of stratospheric O$_3$ depletion chemistry.

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$^c$C. A. Brenninkmeijer et al., Geophys. Res. Lett. 23 (16), 2125 (1996).