ABSOLUTE INTENSITIES OF O_3 LINES IN THE 9-11 μm REGION

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We have completed our analysis of high-resolution (0.0027 cm^{-1}) absorption spectra of ozone[a] to determine absolute intensities of 376 $^{16}O_3$ lines in the 9-11 μm region. The spectra were recorded at room temperature using the Fourier transform spectrometer at the McMath-Pierce facility of the National Solar Observatory at Kitt Peak. The ozone samples were contained in a glass cell having crossed IR-transmitting and UV-transmitting paths approximately 10 cm in each direction. The ozone partial pressures (0.3 to 0.5 Torr) in the cell were determined from measurements of the 254 nm UV-absorption, using the absorption cross-section of Mauersberger et al.[b] as a reference standard. Only spectra for which the ozone partial pressure varied by < 1.0 % during the recording time were selected for analysis. A multispectrum nonlinear least-squares procedure[c] was used to fit four spectra simultaneously to determine intensities for 366 lines in the P, Q, and R branches of the ν_3 fundamental band and 10 lines in the R branch of the ν_1 band. The absolute accuracy of these intensity values ranges from 2 % for the strongest, most well-determined lines to 4 or 5 % for the weakest lines measured. On average, our measured intensities are approximately 1 % larger than the values on the current HITRAN compilation.[d] Our measurement set includes 44 ν_3 lines in common with other recent experimental studies.[e f g] Comparison of these various measurements shows excellent agreement for a few lines and adequate agreement (considering all possible sources of uncertainty and systematic errors) for the others.

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[a] M. A. H. Smith, C. P. Rinsland, V. Malathy Devi, and D. Chris Benner, 52nd International Symposium on Molecular Spectroscopy, Paper RF03 (1997).

[b] K. Mauersberger, D. Hanson, J. Barnes, and J. Morton, *J. Geophys. Res.* **92**, 8480-8482 (1987)

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

[d] L. S. Rothman *et al.*, *JQSRT* **48**, 469-507 (1992); L. S. Rothman *et al.*, *JQSRT*, in press (1998).

[e] H. M. Pickett, D. B. Peterson, and J. S. Margolis, *J. Geophys. Res.* **97**, 20,787-20,793 (1992).

[f] M. R. DeBacker, B. Parvitte, V. Zeninari, and D. Courtois, *JQSRT* **54**, 1009-1018 (1995).

[g] M. R. DeBacker-Barilly and D. Courtois, *Appl. Phys. B* **64**, 607-611 (1997).