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Title

O(2) A-band line parameters to support atmospheric remote sensing. Part II: The rare isotopologues

Source

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Abstract

Frequency-stabilized cavity ring-down spectroscopy (FS-CRDS) was employed to measure over 100 transitions in the R-branch of the $b(1)\Sigma^+(g) \leftarrow X(3)\Sigma^-(g)(0,0)$ band for the rare O(2) isotopologues. The use of (^{17}O) - and (^{18}O) -enriched mixtures allowed for line positions to be measured for the $(^{16}\text{O})(^{17}\text{O})$, $(^{16}\text{O})(^{18}\text{O})$, $(^{17}\text{O})(2)$, $(^{17}\text{O})(^{18}\text{O})$, and $(^{18}\text{O})(2)$ isotopologues. Simultaneous fits to the upper and lower states were performed for each isotopologue using the FS-CRDS positions supplemented by microwave, millimeter, submillimeter, terahertz, and Raman ground state positions from the literature. Positions, line intensities, pressure broadening parameters, and collisional narrowing parameters are reported for the $(^{16}\text{O})(^{18}\text{O})$ and $(^{16}\text{O})(^{17}\text{O})$ isotopologues which are based upon the present study and our earlier FS-CRDS work (Long et al. *J Quant Spectrosc Radiat Transfer* 2010;111:2021 [18] and Robichaud et al. *J Phys Chem A* 2009;113:13089 [15]). The calculated line intensities include a term for the observed Herman-Wallis-like interaction and correct a frequency-dependent error, which is present in current spectroscopic databases.