ABSOLUTE ABSORPTION CROSS-SECTIONS OF THE OZONE WULF BANDS AT 1 MICRON RANGE: MEASUREMENTS WITH HIGH-RESOLUTION CW-CRDS AND DAS LASER TECHNIQUES

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The Wulf absorption bands of ozone near 1 micron are due to the transitions from the electronic ground state towards energy levels of triplet states just above the first dissociation threshold of 1.06 eV. The present work aims at providing absolute absorption cross-sections of ozone with the accuracy up to 1-2% in the near-IR range around 1 micron using the laser continuous-wave cavity-ring-down technique (cw-CRDS) at the dense grid of wavenumbers. The external-cavity diode lasers provided the single-mode generation with the radiation bandwidth less than 1 MHz [1]. The spectrum was recorded with the step of about 0.0035 cm^{-1} and the integration time of 0.5 s per one spectral point. The measured high-resolution spectra in the region from 9744 to 10250 cm^{-1} reveal complex structures of spectral lines broadened by predissociation and correspond to the prominent transparency window of water vapor in the near-IR region suitable for atmospheric applications. The spectrum in the range of 10250-10850 cm^{-1} had the diffuse structure and it was recorded using pressure ramps that proved to be more accurate versus the stationary spectra recording. The comparisons with the previous measurements including the low-resolution data from University of Bremen[2] as well as with the simulations using the theoretical line intensities of spin-rovibronic transitions [3] and empirically adjusted line widths will be discussed. At the higher frequency range of 11900-12650 cm^{-1} of the stronger absorption, the ozone cross-sections were measured using the direct absorption spectroscopy (DAS) method. The work was supported by the RSF grant 19-12-00171-P.

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[3] doi:10.1016/j.jqsrt.2021.107834, O. Egorov, R. Valiev, T. Kurten, and V. Tyuterev, *JQSRT*, **273**, 107834, (2021).