

COMB-ASSISTED CAVITY RING DOWN SPECTROSCOPY OF ^{17}O ENRICHED WATER BETWEEN 7443 AND 7921 cm^{-1}

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The room temperature absorption spectrum of water vapour highly enriched in ^{17}O has been recorded by Cavity Ring Down Spectroscopy (CRDS) between 7443 and 7921 cm^{-1} . Three series of recordings were performed with pressure values around 0.1, 1 and 10 Torr. The frequency calibration of the present spectra benefited of the combination of the CRDS spectrometer to a self-referenced frequency comb. The resulting CRD spectrometer combines excellent frequency accuracy over a broad spectral region with a high sensitivity (Noise Equivalent Absorption, $\alpha_{min} \sim 10^{-11} - 10^{-10} \text{ cm}^{-1}$). The investigated spectral region corresponds to the high energy range of the first hexade. The assignments were performed using known experimental energy levels as well as calculated line lists based on the results of Partridge and Schwenke. Overall about 4150 lines were measured and assigned to 4670 transitions of six water isotopologues (H_2^{16}O , H_2^{17}O , H_2^{18}O , HD^{16}O , HD^{17}O and HD^{18}O). Their intensities span six orders of magnitude from 10^{-28} to 10^{-22} cm/molecule. Most of the new results concern the H_2^{17}O and HD^{17}O isotopologues for which about 1600 and 400 transitions were assigned leading to the determination of 329 and 207 new energy levels, respectively. For comparison only about 300 and four transitions of H_2^{17}O and HD^{17}O were previously known in the region, respectively. By comparison to highly accurate H_2^{16}O line positions available in the literature, the average accuracy on our line centers is checked to be on the order of 3 MHz (10^{-4} cm^{-1}) or better for unblended lines. This small uncertainty represents a significant improvement of the line center determination of many H_2^{16}O lines in the considered region.