

HIGH-RESOLUTION GIGAHERTZ AND TERAHERTZ SPECTROSCOPY OF THE ISOTOPICALLY CHIRAL MOLECULE TRANS-2,3-DIDEUTERO-OXIRANE(c-CHD-CHDO)

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We report the observation and assignment of the rotational spectra of the isotopically chiral molecule, trans-2,3-dideutero-oxirane (c-CHD-CHDO) measured in the gigahertz range of 62-110 GHz and in the terahertz range, 25-80 cm^{-1} (instrumental resolution of 0.00052 cm^{-1}). Normal oxirane (c-C₂H₄O) has been detected by astrophysical spectroscopy in space.^a A small number of lines of trans-2,3-dideutero-oxirane had been previously analyzed in the microwave region^b up to 70 GHz. We have recently^c measured and successfully analyzed the rotational spectrum of monodeutero-oxirane between 65 and 119 GHz using our GHz spectrometer,^d and in the 0.75 to 2.5 THz range measured with our FTIR setup^e at the Swiss Light Source. In the current work, we were able to assign and analyze more than 2500 rotational transitions of the vibronic ground state of trans-2,3-dideutero-oxirane up to J=65. The molecule is also of interest in the context of molecular parity violation, similar to the related molecules.^f Our results are important in relation to isotopic chirality and parity violation,^g and to the possible astrophysical observation of this molecule.

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