

JET COOLED MOLECULAR IONS IN SLIT SUPERSONIC DISCHARGES: HIGH RESOLUTION INFRARED STUDIES OF HYDRONIUM ION ISOTOPOMERS IN THE OD STRETCH REGION

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Jet-cooled high-resolution infrared spectra in the O-D stretch region of partially deuterated hydronium ion isotopomers (e.g., HD<sub>2</sub>O<sup>+</sup>, H<sub>2</sub>DO<sup>+</sup>) are obtained for the first time, exploiting the high ion densities, long absorption path lengths, and concentration modulation capabilities of slit jet discharge methods. The spectra are obtained with a new cw difference frequency mixing spectrometer, based on non-linear subtraction of a fixed frequency single mode Nd:YAG source and a scanning single mode Ti:Sapphire laser in periodically poled lithium niobate, which delivers many tens of microwatts in the required 2550-2650 cm<sup>-1</sup> region. Least-square analysis with a Watson asymmetric top Hamiltonian yields band origins and vibrationally excited rovibrational constants, providing rigorous tests of ab initio potential surface predictions from Rajamaki et al., *J. Chem. Phys.* 118, 10929 (2003) and Huang et al., *J. Chem. Phys.* 118, 5431 (2003).