COMBINATION BANDS OF THE HOOO AND DOOO RADICALS VIA INFRARED ACTION SPECTROSCOPY

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Hydrogen trioxide (HOOO) has been shown to be relatively stable with respect to the OH + O_2 asymptote; therefore, it may act as a sink for hydroxyl radicals in the coldest regions of the atmosphere and exist in measurable quantities. In this work, HOOO and its deuterated analogue DOOO are formed via the association of photolytically generated OH/D with oxygen in the collisional region of a free-jet expansion. Excitation of combination bands comprised of one quantum of OH/D stretch (ν_1) and one quantum of a lower frequency vibration (ν_n) results in dissociation to OH/D + O_2. The resulting OH/D fragments are then state-selectively probed by laser-induced fluorescence. IR action spectra of several structured combination bands were recorded and assigned to *trans*-HOOO and DOOO based on frequency, isotopic shift, and transition type. In addition, unstructured bands were observed and assigned to combination bands of the *cis* conformer. These results indicate that the OOO bend (ν_4) would provide the best means for *in situ* detection of HOOO in the atmosphere.