STABILITY OF HO_3 RADICAL VIA INFRARED ACTION SPECTROSCOPY

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The existence of hydrogen trioxy radicals (HO_3) has several important implications in atmospheric chemistry, as it may act as an intermediate in key chemical reactions and relaxation processes in the atmosphere. In this work, HO_3 was produced from the association of O2 and photolytically generated OH radicals in the collisional region of a supersonic free-jet expansion. Excitation of the OH stretching vibration of HO_3 via tunable infrared radiation causes dissociation to OH + O_2, and the OH fragments are probed by laser-induced fluorescence. The IR action spectrum of HO_3 was recorded for the fundamental and first overtone OH stretches of HO_3 as well as its deuterated analog. Rotationally structured and broadened features were observed and attributed to the *trans* and *cis* conformers of HO_3. The product state distribution of the OH fragment was examined to determine the highest energetically open product channel, which sets an upper limit of 6.12 kcal mol^{-1} for the HO-O_2 binding energy. Calculation of the equilibrium constant for the reaction OH + O_2 + M $\rightleftharpoons$ HO_3 + M (with collision partner M) suggests that HO_3 exists in significant abundance in the vicinity of the tropopause, where it may act as a temporary sink for OH.