SUB-DOPPLER SPECTROSCOPY OF $trans$-HOCO RADICAL IN THE OH STRETCHING MODE

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Rovibrational spectroscopy of the fundamental OH stretching mode of $trans$-HOCO radical has been studied via sub-Doppler high resolution infrared laser absorption in a discharge slit-jet expansion. The $trans$-HOCO radical is formed by discharge dissociation of H_2O to form OH, which then combines with CO and cools in the Ne expansion to a rotational temperature of 16 K. Rigorous assignment of both a-type and b-type spectral transitions is made possible by 2-line combination differences from microwave studies[a], with full rovibrational analysis of the spectrum based on a Watson asymmetric top Hamiltonian. Additionally, fine structure splittings of each line due to electron spin are completely resolved and thus permitting all three ϵ_{aa}, ϵ_{bb}, ϵ_{cc} spin rotation constants to be experimentally determined. Furthermore, the ratio of transition dipole moment along the molecule A and B axis is determined to be μ_a/μ_b = 1.72(5), in agreement with quantum theoretical calculations(1.85).

[a] T. Oyama,W Funato, Y. Sumiyoshi,and Y. Endo, J. Chem. Phys. 134, 174303.