VIBRATIONAL SPECTROSCOPY OF ATMOSPHERIC RELEVANT HALOGENATED HYDROCARBONS: THE C-H-STRETCH VIBRATIONS OF CHLOROMETHYL

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The symmetric stretch vibration (3055.07723(63) cm^{-1})of chloromethyl radical has been characterized via tunable difference frequency IR absorption spectroscopy in a slit supersonic discharge expansion source with a resolution of 0.0001 cm^{-1}. Rotational progressions for both nuclear spin isomers (K = 0,1) and chlorine isotopes are observed and assigned. Rotational analysis and least squares fits to a Watson Hamiltonian have been performed with ground state values were taken from rotational spectra[a], yielding asymmetric top rotational, centrifugal distortion constants and isotope shifts for the vibrationally excited state. Searches at shot noise limited detection sensitivity have also been performed for the asymmetric C-H-stretch vibration (3163-3232 cm^{-1}), confirming theoretical predictions that this band is at least 25 times weaker then the corresponding symmetric stretch vibration.

[a] Y. Endo, S. Saito, E. Hirota, Can. J. Phys. 62, 1347 (1984)