MG03 15 min 2:04

Detection of Carbon-Chain Triplet Molecules, CₙO (n = 2, 4, 6, 8), by PDN-FTMW Spectroscopy

Yasuhiro Ohshima, Teruhiko Ogata, and Yasuki Endo

Rotational spectra of CₙO (n = 2, 4, 6, and 8) have been observed by using a Fabry-Perot type Fourier-transform microwave (FTMW) spectrometer cooperated with a pulsed discharge nozzle (PDN). The molecules have been generated by a pulsed electric discharge of C₃O₂ diluted in Ar, and then adiabatically cooled to ~ 2 K in a subsequent supersonic expansion. All the observed spectra of those species have been analyzed as linear molecules in the 3Σ⁻ electronic ground state. The determined molecular constants, such as rotational, spin-spin coupling, and centrifugal distortion constants, have provided information on the C=O bond lengths, energy gaps between the excited 1Σ⁺ electronic state and the 3Σ⁻ ground state, and rigidity of the molecules in respect of the bending vibrations.

Address of Ohshima and Endo: Department of Pure and Applied Sciences, College of Arts and Sciences, The University of Tokyo, Komaba, Meguro-ku, Tokyo 153, JAPAN
Address of Ogata: Faculty of Liberal Arts, Shizuoka University, Ohya, Shizuoka 422, JAPAN

MG04 15 min 2:21

VIBRATIONAL AND ROTATIONAL LASER SPECTROSCOPY OF SUPersonically COOLED ALKOXY AND ALKYLTHIO RADICALS, P. MISRA, X. ZHU, M.M. KAMAL, A.H. NUR, AND H.L. BRYANT, JR.

The alkoxy (RO; R=CH₃, C₂H₅, i-C₃H₇) and alkylthio (RS) free radicals are important chemical intermediates in gas-phase atmospheric and combustion chemistry. Laser-induced fluorescence (LIF), in conjunction with a supersonic jet environment, has been used to study the vibrational and rotational spectroscopy associated with electronic transitions involving these radicals. RO radicals were generated in situ in the supersonic expansion by excimer laser (KrF @ 248 nm) photolysis of RONO, while RS molecular fragments were produced from similar photodissociation of R₂S₂. Both Nd:YAG-pumped and excimer-pumped tunable dye laser systems were used to record rotationally-resolved laser excitation spectra of the jet-cooled RO and RS radicals. Wavelength-resolved emission spectra of CH₃O and CH₃S were obtained by exciting the molecules at the wavelength of a strong rotational transition within a vibronic band. Several rotational and vibrational frequencies and parameters obtained from the assignments and least-squares fits will be discussed in the context of the involved molecular spectroscopy of the RO and RS radicals.

* Financial support from the NASA Center for the Study of Terrestrial and Extraterrestrial Atmospheres (# NASA NAGW-2550), U.S. Environmental Protection Agency’s Office of Exploratory Research (# R819720-01-0), and the Collaborative Core Unit of Howard University’s Graduate School of Arts & Sciences is gratefully acknowledged.