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

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Rotational spectra of C_nO (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 C_3O_2 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 $^3\Sigma^-$ electronic ground state. The determined molecular constants, such as rotational, spin-spin coupling, and centrifugal distortion constants, have provided information on the C=C bond lengths, energy gaps between the excited $^1\Sigma^+$ electronic state and the $^3\Sigma^-$ ground state, and rigidity of the molecules in respect of the bending vibrations.

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VIBRATIONAL AND ROTATIONAL LASER SPECTROSCOPY OF SUPERSONICALLY COOLED ALKOXY AND ALKYLTHIO RADICALS,*

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The alkoxy (RO; R=CH_3, C_2H_5, i-C_3H_7) 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 R_2S_2. 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 CH_3O and CH_3S 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.

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