

JET-COOLED LASER SPECTROSCOPY OF CYCLOHEXOXY RADICAL

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The laser induced fluorescence(LIF), and laser excited, dispersed fluorescence(DF) spectra of the cyclohexoxy free radical have been observed under free-jet cooling conditions for the $\tilde{B} - \tilde{X}$ electronic transition. In the LIF excitation spectrum, two different types of expansions, characterized by rotational temperatures of 1 and 100 K, have demonstrated that a number of lines, termed hot bands, either nearly or entirely disappear at the lowest jet temperature. The cold spectral bands have two distinct types of structure in rotationally resolved high-resolution spectra. Correspondingly, two distinct sorts of structure are observed in the DF spectra.

LIF transitions to both a' and a'' vibrational levels in the \tilde{B} state are observed and allowed due to a substantial pseudo-Jahn-Teller effect in the \tilde{X} state. We assign hot bands to transitions to the origin and excited vibrational levels of the \tilde{B}^2A' state from the vibrationless level of the low-lying \tilde{A} electronic state. Analyses of the spectra yield vibrational frequencies for the \tilde{X} , \tilde{A} , and \tilde{B} states as well as the energy separations of their vibrationless levels. Although 5 conformers of cyclohexoxy are possible, it appears that all presently observed spectral bands can be accounted for by a single conformer. A more complete rotational analysis is now in progress.

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