INFRARED SPECTROSCOPY OF JET-COOLED TROPOLONE AND TROPOLONE-OD IN THE O-H AND C-H STRETCH REGION

C. A. ARRINGTON, R. K. FROST, F. C. HAGEMEISTER, AND T. S. ZWIER, *Department of Chemistry, Purdue University, West Lafayette, IN 47907-1393.*

Fluorescence-dip infrared spectroscopy has been employed to record the vibrational spectra of gas phase tropolone and tropolone-OD in the O-H and C-H stretch region for the first time. Tropolone, an pseudo-aromatic ringed system, possesses a symmetric $O^{\cdot\cdot}H - O$ tunneling coordinate which produces a ground state tunneling splitting of 0.99 cm^{-1}. Use of a two laser depletion scheme allows separate infrared spectra to be recorded for both the lower (a_1 symmetry) and upper (b_2 symmetry) ground state tunneling levels. In each spectrum, a single transition ascribable to the O-H stretch is observed. The (a_1) O-H stretch at 3134.9 cm^{-1} is close in energy to the (b_2) O-H stretch observed at 3133.9 cm^{-1} indicating that the transitions are to the same excited state tunneling level. Tropolone-OD was investigated in order to identify the C-H stretch vibrations which are close in energy to the red-shifted O-H stretch of tropolone. The spectroscopic results along with recent *ab initio* calculations are discussed in terms of the hydrogen tunneling motion in tropolone.