

## FAR-INFRARED SYNCHROTRON-BASED SPECTROSCOPY OF FURAN: ANALYSIS OF THE $\nu_{14} - \nu_{11}$ PERTURBATION AND THE $\nu_{18}$ AND $\nu_{19}$ LEVELS

D. W. TOKARYK, S. D. CULLIGAN<sup>a</sup>, *Department of Physics and Centre for Laser, Atomic and Molecular Sciences, University of New Brunswick, Fredericton, NB, Canada E3B 5A3*; B. E. BILLINGHURST, *Canadian Light Source, Inc., 101 Perimeter Road, University of Saskatchewan, Saskatoon, SK, Canada S7N 0X4*; and J. A. van WIJNGAARDEN, *Department of Chemistry, University of Manitoba, Winnipeg, MB, Canada R3T 2N2*.

The  $\nu_{14}$  vibrational level of furan lies  $603\text{ cm}^{-1}$  above the ground vibrational state. It is the lowest lying vibrational level for which a transition from the ground state is allowed. Other groups have conducted rotational analyses on fundamental bands of furan at  $745\text{ cm}^{-1}$  ( $\nu_{13}$ )<sup>b</sup>,  $995\text{ cm}^{-1}$  ( $\nu_7$ )<sup>c</sup> and at  $1067\text{ cm}^{-1}$  ( $\nu_6$ )<sup>d</sup>. We have taken the rotationally resolved spectrum of the *c*-type  $\nu_{14}$  band at the Canadian Light Source synchrotron with a Bruker IFS125HR Fourier transform spectrometer operating at  $0.00096\text{ cm}^{-1}$  resolution, and have found it to be perturbed by the  $\nu_{11}$  band at  $600\text{ cm}^{-1}$ , for which transitions from the ground vibrational state are forbidden. By taking the spectra of the *b*-type  $\nu_{18}$  fundamental band and of the very weak *c*-type  $\nu_{18} - \nu_{11}$  band we have been able to analyze the  $\nu_{14} - \nu_{11}$  perturbation. We have also analyzed the spectrum of the *b*-type  $\nu_{19}$  fundamental band.

---

<sup>a</sup>Current address: Inorganic Chemistry Laboratory, South Parks Road, University of Oxford, UK OX1 3QR

<sup>b</sup>B. Pankoke, K. M. T. Yamada, G. Winnewisser, *Z. Naturforsch. A* **48** (1993) 1193–1202.

<sup>c</sup>A. Mellouki, M. Herman, J. Demaison, B. Lemoine, L. Margulès, *J. Mol. Spectrosc.* **198** (1999) 348–357.

<sup>d</sup>A. Mellouki, J. Vander Auwera, J. Demaison, M. Herman, *J. Mol. Spectrosc.* **209** (2001) 136–138.