INFRARED SPECTRUM OF THE $\nu_1$ FUNDAMENTAL BAND OF H$_3$O$^+$

**J. TANG** and **T. OKA**, Department of Chemistry, The University of Chicago, Chicago, IL 60637.

Infrared spectrum of H$_3$O$^+$ has been observed by a difference frequency laser spectrometer with positive column discharges of H$_2$/O$_2$ gas mixtures, which gave a spectrum remarkably simpler than the previous one with H$_2$/O$_2$/He discharges. After extending the previous assignment of the $\nu_3$ fundamental bands to higher J, K transitions, vibration-rotation structures due to the $\nu_3^+ \leftarrow 0^-$ and $\nu_3^- \leftarrow 0^+$ bands of H$_3$O$^+$ were identified with the band origins of 3389.66 cm$^{-1}$ and 3491.17 cm$^{-1}$, respectively, in the region of the strong $\nu_3^\pm \leftarrow 0^\pm$ bands. Molecular constants for the $\nu_3^\pm \leftarrow 0^\mp$ bands were obtained by the least-squares fittings for the observed frequencies. Coriolis interactions between the $\nu_2$ and $\nu_3$ vibrations have been considered to explain some large deviations of the observed transitions from the calculated frequencies in the $\nu_2$ and $\nu_3$ bands.

*W. C. Ho, C. J. Pursell, and T. Oka, J. Mol. Spectrosc. 149, 530 (1991).*