

HIGH-RESOLUTION LASER SPECTROSCOPY OF THE $\tilde{B} \leftarrow \tilde{X}$ TRANSITION OF $^{14}\text{NO}_3$ RADICAL: VIBRATIONALLY EXCITED STATES OF THE \tilde{B} STATE

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Rotationally-resolved high-resolution fluorescence excitation spectra of the $\tilde{B}^2E' \leftarrow \tilde{X}^2A'_2$ electronic transition of $^{14}\text{NO}_3$ radical have been observed for 15860-15920 cm^{-1} region. Sub-Doppler excitation spectra were measured by crossing a single-mode laser beam perpendicular to a collimated radical beam, which was formed by the heat decomposition of $^{14}\text{N}_2\text{O}_5$; $^{14}\text{N}_2\text{O}_5 \rightarrow ^{14}\text{NO}_3 + ^{14}\text{NO}_2$. We have also measured the high-resolution fluorescence excitation spectra of the $^{14}\text{NO}_2 \tilde{A}^2B_2 \leftarrow \tilde{X}^2A_1$ transition to distinguish the $^{14}\text{NO}_3$ signals from the $^{14}\text{NO}_2$ signals in the observed region. The typical linewidth was 30 MHz and the absolute wavenumber was calibrated with accuracy 0.0001 cm^{-1} by measurement of the Doppler-free saturation spectrum of iodine molecule and fringe pattern of the stabilized etalon. The observed rotational lines were too complicated to find any rotational series. In the observed spectra, only the rotational line pairs from the $\tilde{X}^2A'_2(v'' = 0, K'' = 0, N'' = 1, F_1 \text{ and } F_2)$ levels are assigned unambiguously by using the combination differences of the $\tilde{X}^2A'_2$ state and measurement of the Zeeman splittings similar to the analysis of the 0-0 band at around 15100 cm^{-1} region.^{a b} The observed results suggest the observed vibrationally excited states of the \tilde{B}^2E' state are also interacts with the other vibronic levels similar to the $\tilde{B}^2E'(v' = 0)$ level.

^aK. Tada, W. Kashiwara, M. Baba, T. Ishiwata, E. Hirota, and S. Kasahara, *J. Chem. Phys.* **141**, 184307 (2014).

^bK. Tada, T. Ishiwata, E. Hirota, and S. Kasahara, *J. Mol. Spectrosc.*, **321**, 23 (2016).