ROTATIONALLY-RESOLVED HIGH-RESOLUTION LASER SPECTROSCOPY OF THE $B\ ^2E' \leftarrow X\ ^2A_2'$ TRANSITION OF $^{15}NO_3$ RADICAL

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Nitrate radical (NO_3) has two electronic excited states: $A\ ^2E"$ and $B\ ^2E'$ near the electronic ground state: $X\ ^2A_2'$. These three electronic states can vibronically interact each other. Therefore, NO_3 is one of the great subjects for understanding intramolecular interactions in polyatomic radicals. High-resolution fluorescence excitation spectrum and its magnetic effect of the 662 nm band, which is assigned as the 0 - 0 band of the $B\ ^2E' \leftarrow X\ ^2A_2'$ transition, of $^{14}NO_3$ have been observed.[a] The observed $^{14}NO_3$ spectrum was too complicated to be analyzed rotationally because of less rotational regularity. In this work, we observed high-resolution fluorescence excitation spectrum of the 662 nm band of $^{15}NO_3$. The observed region was 15080 - 15103 cm^{-1}. We also observed the Zeeman splitting of intense rotational lines for unambiguous rotational assignment. A part of the observed rotational lines was successfully assigned by using ground state combination differences calculated from the reported molecular constants[b] and the observed Zeeman patterns. The effective molecular constants of the excited state were determined under the oblate symmetric-top model.

[a] K. Tada, W. Kashihara, S. Kasahara, M. Baba, T. Ishiwata, and E. Hirota, The 68th OSU Symposium, WJ04 (2013).

[b] R. Fujimori, N. Shimizu, J. Tang, T. Ishiwata, and K. Kawaguchi, J. Mol. Spectrosc., 283, 10 (2013).