

ZEEMAN EFFECT OF *TRANS*-GLYOXAL STUDIED BY DOPPLER-FREE TWO-PHOTON ABSORPTION SPECTROSCOPY

MASATOSHI MISONO, JIN GUO WANG, HAJIME KATO, *Molecular Photoscience Research Center, Kobe University, Nada, Kobe 657-8501, Japan*; MASA AKI BABA, *Faculty of Integrated Human Studies, Kyoto University, Sakyo, Kyoto 606-8501, Japan*.

Doppler-free two-photon absorption (DFTPA) spectroscopy was applied to the $A^1A_u(v_7 = 1) \leftarrow X^1A_g(v = 0)$ transition of *trans*-glyoxal in the magnetic field of 6 T. In the present experiment, Q_Q transitions, in which the initial and the final state have the same J and K , were observed. Here J is the total angular momentum and K is its component along the figure axis. The observed line profiles and the magnitude of Zeeman splitting showed the peculiar dependences on J , K , and on the laser polarization.

DFTPA spectra were measured when the laser polarization was parallel to the magnetic field (π pump) and when it was perpendicular to the magnetic field (σ pump). Both for π and σ pump, the magnitude of the Zeeman splitting become large as K increases for given J , and it also become large as J increases for $K = J$ transitions. When J is given, for π pump and large K , the line intensities take the maximum values at $M = \pm J$ and the minimum value at $M = 0$, where M is the component of J along the magnetic field, while the line intensities for σ pump show the opposite M -dependences. The dependences of the line intensities on J , K and M were also studied theoretically, and the results explained the observed ones well.