

SUB-DOPPLER MOLECULAR BEAM HIGH RESOLUTION SPECTROSCOPY AND THE ZEEMAN EFFECT OF THE $S_1^1B_{2u}$ ELECTRONIC STATE OF BENZENE

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There are many dynamics such as intramolecular vibrational redistribution (IVR), internal conversion (IC) and intersystem crossing (ISC) in the excited electronic states of benzene. In order to investigate these phenomena, we measured the sub-Doppler high-resolution spectra of 6^1 , $6^1 1^1$ and $6^1 1^2$ bands in the $S_1^1B_{2u}$ electronic state and the Zeeman effect in the magnetic field of 1.3T by means of a collimated molecular beam spectroscopy. The linewidth and power of the cw-UV laser light produced by doubling the frequency of a single-mode ring dye laser (Coherent CR699-29) was around 2MHz and 10mW, respectively. The measured rotational linewidth was 30MHz, which was narrow enough to resolve all the rotational lines. The rotational perturbations between singlet levels were observed in the $6^1 1^1$ and $6^1 1^2$ band. The magnitude of the Zeeman splitting of each rotational line was observed to increase with K quantum number and to have a maximum value at $K = J$ in a given J level. The rotational quantum number dependence is almost the same within these three bands. These results indicate that the direction of a magnetic moment is perpendicular to the molecular plane and the mixing of singlet and triplet electronic states (ISC) are not sensitive to the energy levels in this energy region.