ELECTRONIC SPECTROSCOPY OF JET COOLED THIOPHENOXYL RADICAL

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The thiophenoxyl radical, C_6H_5-S (ϕ-S), is an aromatic free radical with a benzyl type π-electronic structure. We have generated the ϕ-S by ArF laser photolysis in supersonic free jet expansions, and observed laser induced fluorescence (LIF) of the green-blue band. We have measured the vibrationally and rotationally resolved LIF excitation spectra and the vibrationally resolved LIF dispersed spectra from single vibronic levels (SVL). On the basis of the precise vibrational analysis of the dispersed spectra, we propose new vibrational assignments to the excitation spectrum. The band types of the vibronic bands determined from the rotationally resolved excitation spectra make it possible us to give a definite assignment of the $D_2\ 1^2A_2$ – $D_0\ 1^2B_1$, $\pi^* \leftarrow \pi$, electronic transition for the green-blue band of ϕ-S. Based on the results of the spectroscopic assignments, we will discuss the electronic and vibrational structure of ϕ-S both on the ground $D_0\ 1^2B_1$ and the second excited $D_2\ 1^2A_2$ states.