LASER-INDUCED FLUORESCENCE EXCITATION AND DISPERSED FLUORESCENCE SPECTRA OF HCBr AND HCCl IN A DISCHARGE SUPERSONIC FREE JET EXPANSION

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The electronic spectra of methylene and halomethylenes are complicated by Renner-Teller, spin-orbit, and Fermi resonances couplings whose combined effects make the analyses of these spectra very difficult.[a] In addition to its own value in understanding the ground electronic state structure, the information of the ground state vibrational structure is crucial to unravel the interplays between these interactions. Nevertheless, due to the experimental difficulties, there is a paucity of laser-induced fluorescence (LIF) spectra of these halomethylenes.[b] Most experiments on HCBr and HCCl thus far have focused on the absorption or LIF excitation spectra. We have successfully acquired the LIF excitation and dispersed fluorescence spectra of pumping several $\tilde{A}\leftarrow\tilde{X}$ vibronic transitions of these molecules in a discharge supersonic free jet expansion. The dispersed fluorescence spectra reveal the details of the ground state vibrational structure of these species as well as the perturbations from the background triplet state. Our progress on the experiments and analyses will be presented.

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[b] S. Xu, K. A. Beran, and M. D. Harmony, J. Phys. Chem. 98, 2742 (1994).