LASER-INDUCED FLUORESCENCE AND DISPERSED FLUORESCENCE SPECTRA OF THE HCCl/DCCl $\tilde{A}$–$\tilde{X}$ VIBRONIC TRANSITION

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The electronic spectroscopy of chloromethylene (HCCl/DCCl) is very complicated due to the Renner-Teller effects, spin-orbit couplings, and Fermi resonances as well as the interplays between these interactions. Most experimental studies thus far have focused on the excitation spectra of these species. In contrast, the information on the vibrational structure of the ground electronic state ($\tilde{X}^1A'$) is very limited.[ab] Analogous to HCBr/DCBr[cd], we have recorded the laser-induced fluorescence (LIF) and dispersed fluorescence (DF) spectra following the excitation of the HCCl/DCCl $\tilde{A}\leftarrow\tilde{X}$ vibronic bands between 570 nm and 620 nm in a direct current discharge supersonic free jet expansion. The analyses of these dispersed fluorescence spectra result in detailed information of the HCCl[e]/DCCl $\tilde{X}$ state vibrational structure. The vibrational frequencies of all three modes were determined for the first time. In addition, since no perturbation was observed in the observed vibrational structure, a lower limit of triplet-singlet energy gap was established. Our progress on the experiments and analyses will be presented.

Acknowledgment: The authors gratefully acknowledge the National Science Council, Taiwan for its support of this work via Grant No. NSC90-2113-M-008-019.

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