NEW ELECTRONIC SPECTRA OF THE HCCl/DCCl $\tilde{A}$–$\tilde{X}$ VIBRONIC BANDS

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We have successfully acquired new dispersed fluorescence spectra following the excitation of several $\tilde{A}\leftarrow\tilde{X}$ vibronic bands of HCCl and DCCl at visible wavelengths in a discharge free jet expansion using an intensified charge-coupled device (ICCD) detector. The new dispersed fluorescence spectra reveal more details of the $\tilde{X}^1A'$ state vibrational structure in these molecules than our previous reports.[a,b] Complete vibrational parameters including fundamental frequencies, anharmonicities, and coupling constants were determined for the HCCl/DCCl $\tilde{X}^1A'$ state. Furthermore, perturbations from the background triplet state ($\tilde{a}^3A''$) were clearly observed in the new dispersed fluorescence spectra, and therefore the singlet-triplet energy gap could be determined. Additionally, a couple of new $\tilde{A}\leftarrow\tilde{X}$ vibronic bands were found in the laser excitation spectra of HCCl and DCCl. The rotationally resolved excitation spectra of a few $HC^{35}Cl$ $\tilde{A}\leftarrow\tilde{X}$ vibronic bands and those of $HC^{37}Cl$ were recorded and analyzed. Our progress on the experiments and analyses will be presented.

[a] C.-W. Chen, T.-C. Tsai, and B.-C. Chang, Chem. Phys. Lett. 347, 73 (2001).
[b] C.-L. Lee, M.-L. Liu, and B.-C. Chang, J. Chem. Phys. 117, 3263 (2002).