REINVESTIGATION OF THE EMISSION SPECTRA FOLLOWING THE 266 NM PHOTOLYSIS OF IODOMETHANES

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Nascent emission spectra following the 266 nm photolysis of iodomethanes (CHI_3, CH_2I_2, CH_3I, and CH_2ICl) were recorded in a slow flow system, and are similar to those following the 266 nm photolysis of bromomethanes[a] except a number of unknown bands that appear between 520 nm and 820 nm. Interestingly, there are no isotopic shifts in these unknown bands even when the precursors were replaced by the deuterated or ^{13}C-substituted isotopomers (CD_2I_2, CD_3I, and $^{13}CH_2I_2$).[b] This indicates that the carrier of these unknown bands does not contain any hydrogen or carbon atoms. Laser-induced fluorescence (LIF) excitation and dispersed-fluorescence (DF) spectra were recorded, but these spectra show different vibrational structures than those of the unknown bands. While the LIF and DF spectra can be well described by the I_2 $b^3\Pi^+_{0,u}-X^1\Sigma^+_g$ transition, there exist systematic deviations between the unknown bands and the I_2 $b-X$ transition. We have improved the signal-to-noise (S/N) ratios and the resolution for these unknown bands. Our new analysis shows that the unknown bands consist of several band systems including the I_2 $b-X$ transition. Moreover, the excited state iodine atom was found in the nascent emission spectra, but its formation mechanism still remains unsolved. The details of our current progress will be presented.

[a] S.-X. Yang, G.-Y. Hou, J.-H. Dai, C-.H. Chang, and B.-C. Chang, J. Phys. Chem. A **114**, 4785 (2010).

[b] J.-J. Du, C.-H. Chen, and B.-C. Chang, 67th OSU International Symposium on Molecular Spectroscopy, WG04 (2012).