

EMISSION SPECTROSCOPY FOLLOWING THE MULTIPHOTON PHOTOLYSIS OF HALOMETHANES AT NEAR-ULTRAVIOLET WAVELENGTHS

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Emission spectroscopy including nascent emission and laser-induced dispersed fluorescence was adopted to investigate the multiphoton photolysis mechanism of halomethanes at near-ultraviolet wavelengths in a slow flow system. In the 266 nm photolysis of the interested halomethanes (CHBr_3 , CHBr_2Cl , CHBrCl_2 , CH_2Br_2 , CHI_3 , CH_2I_2 , and CH_3I), several excited species such as CH ($A^2\Delta$, $B^2\Sigma^-$, and $C^2\Sigma^+$), atomic Br or I, and C_2 ($d^3\Pi_g$) were observed in the nascent emission spectra. Halomethylenes (CHX , $\text{X} = \text{Br, Cl, I}$), the reactive intermediates, were not observed in nascent emission spectra, but they can be found using laser-induced dispersed fluorescence spectroscopy following excitation of their $\tilde{A}^1A''(0, v_2, 0) \leftarrow \tilde{X}^1A'(0, 0, 0)$ transitions. Interestingly, CHBr was seen only in the photolysis of CHBr_3 , whereas CHCl was only discovered when the precursor is CHBr_2Cl or CHBrCl_2 . The photolysis laser power dependence and emission waveform measurements were also conducted. In addition, nascent emission spectra following the photolysis at longer near-ultraviolet wavelengths (280 nm and 355 nm) were acquired. The results show the distinctive differences between the photolysis of bromomethanes (CHBr_3 , CHBr_2Cl , CHBrCl_2 , and CH_2Br_2) and that of iodomethanes (CHI_3 , CH_2I_2 , and CH_3I). Our recent progress will be presented.