PHOTOLYSIS OF MATRIX-ISOLATED HCl-Cl_2 and HBr-Br_2 COMPLEXES

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Although the existence of stable trihalogens has been proposed in several contexts, they have not been definitively observed by spectroscopic means. We are currently investigating a technique for isolating neutral trihalogens in rare gas solids. HX-YZ complexes (where X, Y, and Z are halogen atoms) are trapped in solid Ar and then photolyzed. The hydrogen atom readily escapes the matrix cage, while the halogen atoms remain trapped.

In-situ photolysis of Cl_2/HCl/Ar matrices generated a new species that was characterized through laser excitation and wavelength resolved fluorescence measurements. This species exhibited absorption and emission bands centered at 310 nm and 470 nm, respectively. Work is in progress to establish the identity of this species.

In-situ photolysis of Br_2/HBr/Ar matrices yielded electronic spectra that were consistent with absorption and emission of Br_2 perturbed by a near-by Br atom. These results suggest that, for the states probed, Br_3 behaves as a van der Waals complex. Further work on this system will also be presented.