DETECTING HYDROGEN ATOMS IN SOLID PARAHYDROGEN USING FTIR SPECTROSCOPY

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Our group is currently studying the 193.3 nm photochemistry of a number of precursor molecules isolated in solid parahydrogen (pH_2) using high-resolution FTIR spectroscopy. In photochemical studies of formic acid[a] and ammonia, right after the photolysis laser is turned off, we observe metastable satellite peaks in close proximity to the strong rovibrational transition out of the ground state of the respective monomer photoproducts H_2O and NH_3. In both cases, there are two satellite peaks near the R(0) monomer transition. We have assigned these satellite features to H-H_2O and H-NH_3 radical clusters that form via reactions of the photoproduct with the pH_2 host. We will present IR spectroscopic studies of these two H-atom cluster systems that we hope to use in future photochemical studies to measure the concentration of H-atoms in our sample using FTIR spectroscopy.

[a] K. A. Kufeld, W. R. Wonderly, L. O. Paulson, S. C. Kettwich, and D. T. Anderson, *J. Phys. Chem. Lett.* **3**, 342-347 (2012).