INFRARED CAVITY RINGDOWN SPECTROSCOPY OF SOLVATED STRONG ACIDS

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The gas-phase HCl and DCl stretch modes of $HClH_2O$, $DCl(D_2O)_n$, n = 1, 2, were characterized using infrared cavity ringdown laser absorption spectroscopy [a]. The spectral shifts with respect to the HCl and DCl monomers are consistent with theoretical predictions and matrix isolation work. Rotational structure was resolved for $DClD_2O$ and spectroscopic constants for both chlorine isotopomers were determined. The spectral shifts and band shapes were similar to those observed for the bonded OH stretch of pure water clusters. Cluster number densities (ca. 10^{12} cm^{-3}) were slightly lower than found for the pure water clusters under similar conditions. Predissociation and IVR broadening in the acid-water clusters were determined to be qualitatively similar to the case of pure water and DF clusters.

[a] A. J. Huneycutt, R. J. Stickland, F. Hellberg and R. J. Saykally, J. Chem. Phys., 118, 1221 (2003).