# ROTATIONALLY RESOLVED INFRARED SPECTRA OF THE $Cl^-$-$H_2$, $Cl^-$-$D_2$, AND $Br^-$-$D_2$ ANION COMPLEXES

D. A. WILD, P. P. WOLYNEC, Z. M. LOH, E. J. BIESKE, *Department of Chemistry, University of Melbourne, 3010, Australia*.

Rotationally resolved mid-infrared spectra the $Cl^-$-$H_2$, $Cl^-$-$D_2$, and $Br^-$-$D_2$ anion complexes have been observed by photodissociation in a tandem mass spectrometer. The spectra are consistent with complexes that possess linear equilibrium structures. Analysis yields vibrationally averaged intermolecular intermolecular separations and facilitates the construction of effective radial potential energy curves. In all three cases, vibrational excitation of the diatomic results in a substantial contraction of the intermolecular bond and an increase in the intermolecular well depth. Infrared spectra of larger $F^-$-$(D_2)_n$ and $Cl^-$-$(D_2)_n$ clusters suggest that they possess structures such that a central halide ion is surrounded by equivalent hydrogen-bonded $D_2$ molecules.