INFRARED SPECTROSCOPY OF SIZE-SELECTED PROTONATED MOLECULAR CLUSTERS: $(N_2)_2H^+$, $(CO)_2H^+$, AND $(O_2)_2H^+$,

ALLEN M. RICKS, GARY E. DOUBERLY, and MICHAEL A. DUNCAN, *Department of Chemistry, University of Georgia, Athens, Georgia 30602*.

Cold, rare gas tagged, gas phase protonated molecular dimers are produced in a pulsed electric discharge supersonic expansion cluster source. In such systems the proton is shared between the two molecules. The intermolecular proton transfer potential in these systems is generally very flat due to the identical proton affinities of the bound molecules. This leads to a very low frequency and very intense intermolecular proton stretch that is poorly modeled by the harmonic approximation. This intense mode also causes large amounts of coupling between vibrational modes and thus a complicated spectrum for such simple systems. The infrared spectra of the size-selected species are obtained *via* infrared photodissociation spectroscopy. The structure and spectroscopy (700-4000 cm^{-1}) of the dimers of protonated nitrogen, carbon monoxide and oxygen will be discussed as well as attempts to model the spectrum using sophisticated *ab initio* methods.