FURTHER INVESTIGATION OF MULTI-PHOTON ABSORPTION IN HYDRATED CESIUM ION CLUSTERS

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Infrared spectra of cluster ions are normally obtained from predissociation (IRPD) action spectra, where the absorption of a photon from a tunable IR laser causes the cluster to dissociate. We have traditionally obtained these spectra by monitoring the loss of the most labile moiety or ligand from the cluster using mass spectrometry. Recently, it has been observed that additional spectral information can be obtained by monitoring the loss of multiple ligands. The IRPD spectra of $Cs^+(H_2O)_{4-6,8,10}$, monitoring the loss of $(H_2O)_{1-3}$, and $Cs^+(H_2O)_{4-6}Ar$, monitoring the loss of $Ar(H_2O)_{0-2}$ from 3100-3800cm^{-1} will be reported. We will show that certain spectral features are present in all loss channels, while other features are suppressed in the multiple-loss channels. Additionally, these spectra suggest that a multi-photon absorption (MPA) process is at work. We will discuss the structural features in the cluster ions likely responsible for these different spectral components and why they exhibit different MPA behavior.