INFRARED PHOTODISSOCIATION SPECTROSCOPY OF METAL WATER INTERACTIONS

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Metal cation water complexes are formed via laser ablation in a pulsed nozzle molecular beam configuration. Ions are then mass selected in a reflectron time-of-flight mass spectrometer to be analyzed. IR photodissociation spectroscopy is used to investigate $M^+(H_2O)$ complexes in the OH stretching region. Alkali, alkaline earth, and first row transition metals are analyzed in this study to determine if any trends are present. By looking at the shift of the symmetric and asymmetric stretches of water, the bonding aspects of the metal water complex can be determined. Different characteristics are present depending on the metal that is studied. For some metals there is a greater red shift in the OH stretching frequencies than in others, which is not directly tied to the binding energy. Along with shifts in the frequencies of the water molecule, there are also differences in the relative intensities of the bands that change with each metal.