INFRARED SPECTROSCOPY OF DOUBLY-CHARGED METAL-WATER COMPLEXES

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Rare gas tagged, cold doubly charged vanadium-water complexes are produced in the supersonic expansion cluster source via laser vaporization technique. Often the doubly charged metal-water complexes are asymptotically unstable because of the charge transfer from the M^{2+} to H_2O if the second ionization energy of the metal is greater than the ionization energy of water (12.6eV). Therefore, the ion density of these species usually much lower than the cationwater complexes in the cluster source. We have investigated the $V^{2+}(H_2O)Ar_n$ complexes via Infrared photodissociation spectroscopy in the O-H stretch region of the water. The O-H stretch of the water is shifted to the lower frequency than that of metal cation water complex due to the higher charge on the metal. Theoretical calculations were also done to support our experiment and to get the structures of these complexes as well.