INFRARED PHOTODISSOCIATION SPECTROSCOPY OF PROTONATED WATER CLUSTERS NEAR THE MAGIC NUMBER $H^+(H_2O)_{21}$

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$H^+(H_2O)_n$ complexes in the intermediate size range (n=10-30) are studied by infrared photodissociation spectroscopy near the symmetric and asymmetric stretching vibrations of water (3657 cm^{-1}, 3756 cm^{-1}). The complexes fragment by the loss of intact, multiple water molecules and their infrared spectra are compared to the predictions of theory. The spectrum for the magic number n=21 cluster shows only one distinct feature in the O-H region indicating all the water molecules occupy similar binding sites. Surprisingly, a single band is also observed for n=22 and no photodissociation is observed for the calculated fundamental of the H_3O^+ ion core near 2500 cm^{-1}. Possible interpretations of the above results will be discussed.