MOLECULAR LIGHTNING RODS: CHARGE STEERING DURING IONIZATION OF THE ISOMERS OF HCCCN-HCN AND HCCH-HCN IN HELIUM NANODROPLETS

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Dopant species embedded in helium nanodroplets can be ionized via a charge transfer mechanism following electron bombardment of the droplet. The electron impact ionizes a helium atom somewhere in the droplet, and the charge then rapidly migrates from atom to atom, until it is transferred to the embedded dopant or a He_n^+ ion is formed and ejected from the droplet. Recent results [b] have revealed that the electrostatic moments of the dopant species steer the charge during its migration through the droplet. A wide variety of complexes exhibiting multiple isomers have now been studied in helium nanodroplets. Often the isomers of these systems have electrostatic moments pointing to different parts of the complex, presenting us with the exciting opportunity to study the effect of steering the oncoming charge to a particular site. We have utilized Optically Selected Mass Spectrometry, a technique which combines high resolution infrared spectroscopy with mass spectrometry, to observe the ions created following charge transfer to the isomers of binary HCCCN-HCN and HCCH-HCN complexes. For both systems, we find that the ions formed are strongly dependant on the isomer ionized. The observed behavior is discussed in terms of the site of initial charge localization and the structure of the isomer.

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