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Impact of an impurity in the thermalization of water nanodroplets

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Many molecules are spread in the earth atmosphere and observed as components of aerosol since the industrial revolution. Besides, some organic molecules such as pyridine evidence a significantly increased atmospheric concentration but are not observed as components of the atmospheric aerosols. Pyridine (C_5H_5N) is a hydrophobic molecule and the pyridinium-water clusters are of interest since water plays a key role in the aerosol nucleation. The Molecular-Cluster Irradiation Device (DIAM) at the *Institut de Physique des 2 Infinis de Lyon* is dedicated to the exploration of out-of-equilibrium mass- and energy- selected small molecular clusters. The evaporation of water molecules from out-of-equilibrium pyridinium-water cluster ions is studied using the correlated ion and neutral time-of-flight mass spectrometer technique (COINTOF) in combination with a velocity-map imaging (VMI) method. The role of the pyridium versus hydronium ion in such water nanodroplets is investigated. The results highlight the importance of the ion-molecule interactions in the thermalization process, a question that underpins the vast majority of atmospheric and biological phenomena especially when water is involved.

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