

UV-induced Protonation in Ice. : Implication for the Formation of Polyatomic Ions in Interstellar Clouds

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UV irradiation of water-ice films at low temperature (50 - 130 K) induces the protonation of the molecules adsorbed on the ice surface. This solid-phase protonation is explained by the photo-generation of long-lived protonic defects in ice, proton transfer to the adsorbate molecules, and the kinetic stabilization of the protonated ions. Facile occurrence of this process in the low-temperature environment suggests that it may play an important role in producing polyatomic ions in interstellar space through grain surface reactions. In this experiment, by using quantitative analysis, quantum yield for protonated methylamine was deduced.