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# Reactive Ion Scattering Study of Ice Surfaces. Proton Transfer and H/D Exchange Reactions

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Ice film surfaces were examined by using the reactive ion scattering (RIS) of low energy (＜35 eV) cesium ion beams. Neutral molecules (X) on the surface were detected in the form of cesium-molecule ion clusters (CsX＋). Ionic species on the surface were desorbed from the surface via a low energy sputtering (LES) process below the threshold energy of secondary ion emission. The RIS and LES methods allowed us to study the H/D exchange reactions between H2O and D2O molecules on the surface and the associated proton transfer mechanisms. Specifically, H/D exchange kinetics was examined for D2O ice films (～10 BL) covered with a small amount of H2O (＜0.5 BL), in the presence or absence of HCl adsorbates which provided excess protons on the surface.