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**Two-Dimensional Organic Chemistry : Reaction of
HBr on Frozen Films of Ethanol and
2-methyl-2-propanol**

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With the objective of gaining insight into the chemistry in the surface or near-surface regions of frozen alcohols, we have studied simple chemical reactions on frozen films of alcohols under ultrahigh vacuum condition. We will present a reactive ion scattering(RIS) study of reactions of HBr on frozen films of ethanol and 2-methyl-2-propanol [(CH₃)₃COH], and discuss applications to the interstellar grain chemistry. From 100 to 150 K, protonated ethanol and carbocation (CH₃)₃C⁺ were dominant products on the frozen films of ethanol and 2-methyl-2-propanol, respectively. The reaction yields of ethylbromide [C₂H₅Br] and 2-chloro-2-methylpropane [(CH₃)₃CBr] were very low (< 0.1 % and < 2 %, respectively) on the present films, whereas they are produced very efficiently in the ambient condition. These observations indicate that the diffusive attack of Br⁻ into the protonated ethanol and the carbocation is a bottleneck in the bromide substitution pathways. To explain the immobility of Br⁻, possible kinetic barrier on the cold surfaces will be discussed.