

# Formation of simple organic molecules on an ice dust in a molecular cloud: hydrogenation of CO to formaldehyde and methanol

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Simple organic molecules, namely, formaldehyde and methanol have been found abundantly in interstellar ice. Chemical reactions in gas phase and the photolysis and ion-induced reaction on ice are inefficient to produce the observed abundance of these molecules in the core of molecular cloud. We performed the experiment on the hydrogenation of CO molecules on ice. The hydrogenation can be a key process in the core where the radiation field is very weak.

The experiment was performed in an ultra-high vacuum chamber with a microwave-powered atomic source. The sample mixed ices, H<sub>2</sub>O-CO and H<sub>2</sub>O-H<sub>2</sub>CO, prepared on an Al-substrate at 10-20K were used in the independent measurements. The variations of the column densities in ice for the parent and products were measured by FTIR.

We found that the formation of formaldehyde and methanol proceeds very efficiently under the condition of molecular clouds. The analysis of the data indicates the reactions proceed by the tunneling effect. The dependence of reaction rates on the ice temperature and the comparison with the observation will be presented in the talk.