

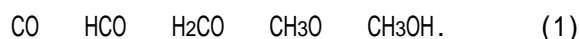
Evaluation of catalytic effect of amorphous ice on the surface atomic reactions

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【Outline of survey】

Methanol (CH₃OH) and formaldehyde (H₂CO) have been identified in interstellar ice dusts in molecular clouds. These molecules are important as the precursors of more complex organic molecules. We experimentally found that these molecules are formed by the successive hydrogenation of CO at 10 K by



We also found by investigating the temperature and compositional dependences that amorphous water ice has a catalytic effect on the reaction (1).

We will measure the rate constants of each step of reaction (1) and evaluate the catalytic effects of amorphous water ice. We also analyze the surface structure of amorphous ice and adsorption states of atomic hydrogen on the surface of amorphous ice.

【Expected results】

There has been no work on the catalytic effects of amorphous water ice on the hydrogenation of CO at low temperatures (quantum tunneling reaction). The present work will clarify the new concept "Catalytic effect of amorphous ice on the quantum tunneling reaction" by measuring the reaction rates. The results will give important information about the evolution of interstellar molecules.

【References by the principal researcher】

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The dependence of H₂CO and CH₃OH formation on the temperature and thickness of H₂O-CO ice during the successive hydrogenation of CO. *Astrophys. J.*, 588, L121-L124.

【Term of project】 FY 2005-2009

【Budget allocation】 79,400,000 yen

【Homepage address】 <http://risu.lowtem.hokudai.ac.jp>