P036-P025 Time: May 28 17:00-18:30

Measurements of H2CO and CH3OH yields in hydrogen atom addition to CO molecule on H2O-CO amorphous ice at 10K

Naoki Watanabe[1], Akira Kouchi[2]

[1] Inst. of Low Temp. Sci., Hokkaido Univ., [2] Inst. Low Temp. Sci., Hokkaido Univ

http://risu.lowtem.hokudai.ac.jp

An abundant amount of formaldehyde (H2CO) and methanol (CH3OH) molecules embedded in ice dusts was found in a various sources of molecular clouds by the ISO. These species are important as a precursor of complex organic molecules. For the formation of H2CO and CH3OH, it is widely accepted that surface reaction is more effective than ion-molecule reactions in gas phase. UV-induced production from CO-H2O amorphous ice is one of possible reaction. However, CO2 formation is main channel in the UV photolysis of CO-H2O amorphous ice. Therefore, hydrogen atom addition to CO is more probable. Successive addition of hydrogen atom to produce H2CO and CH3OH has been often studied theoretically. On the other hand, there has been only one experimental work by Hiraoka et al. They observed H2CO and CH3OH products in the H-atom deposited CO solid at 12K. However, further investigation is still desired because they did not carry out in situ measurement (they adopted thermal desorption method) and did not use H2O dominant ice. We performed a quantitative experiment on the H-atom addition reaction in CO-H2O amorphous ice. Amorphous ice was deposited on an aluminum plate cooled to 10K in a vacuum chamber of which pressure is of the order of 1E-10 Torr. The hydrogen atomic beam was irradiated on the amorphous ice at 10K. The molecules in ice were monitored by a Fourie transform infrared spectrometer. After the irradiation, the ice was heated and desorbed species were measured by a quadrupole mass analyzer. Our measured H2CO and CH3OH yields are two orders higher than those by Hiraoka. The results show that the H-addition is very rapid rather than expected before. We will estimate the reaction rate by using the H flux and the irradiation time and discuss how efficient this process is in molecular clouds.