

## Measurement technique to quantify OH radicals photochemically generated on the ice surface

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Reaction processes of many molecules are presumably involved in oxidative atoms/molecules generated by photodecomposition of molecules adsorbed on cold dust grains. Hydroxyl (OH) radicals are considered as one of them. The chemistry of OH radicals plays a key role in the radiolysis and photolysis of water-rich ices of astrochemical origin. Measurements of OH radical in water-ice in the laboratory have been done by UV, EPR, X-ray absorption, and infrared absorption measurements. However, quantification of OH radicals on the ice surface has not yet been made. In the present work, we have tried to develop the measurement technique to quantify OH radicals photochemically generated on the surface of ice film. In this technique, OH are converted to the different molecule by utilizing the chemical reaction, and monitored through reflection absorption infrared spectroscopy. We have investigated the effect of ice temperature on abundance of OH radicals on the ice surface at 8-70 K. In addition, the effect of ice surface morphology on abundance of OH radicals has been studied by preparing the amorphous solid water and polycrystalline ice. The present study experimentally shows both the temperature and surface morphology plays an important role in abundance of OH radicals on the ice surface.

Keywords: OH radical, ice, vacuum-ultraviolet light, RAIRS, surface