

SUBLIME RESULTS: THE EFFECTS OF UV PHOTOLYSIS ON METHANOL WATER ICES AND THE PRODUCTION OF COMPLEX ORGANIC MOLECULES

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Ultraviolet radiation facilitates chemical reactions in interstellar ice mantle during star and planet formation. These chemical reactions produce complex organic molecules (COMs) that may be essential in the production of prebiotic molecules. We are studying UV-driven chemistry in ices with the SubLIME technique, a laboratory set up that works at cryogenic conditions and ultra-high vacuum. Experiments were conducted to study the abundance ratios of organics sublimated from UV-photolyzed methanol/water ice mixtures with varying methanol concentrations. Submillimeter rotational spectroscopy, quadrupole mass spectrometry, and Fourier-transform infrared transmission spectroscopy were used to monitor the products in both the solid and gas phases. COMs were seen to form at all concentrations of methanol. However, at higher concentrations of methanol, COMs containing oxygen atoms formed quickly. In contrast, we detected COMs with higher hydrogen content at higher concentrations of water. This talk will present the experimental design and results for the ice chemistry. A second talk will discuss the impact of the water:methanol ratio on the formation of carbon-containing gas phase volatiles under the same experimental conditions.