LABORATORY INVESTIGATION OF SIMULTANEOUS UV PHOTOPROCESSING AND TEMPERATURE PROGRAM DESORPTION OF INTERSTELLAR ICE ANALOGS

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Ultraviolet radiation facilitates chemical reactions in interstellar ice mantles during star and planet formation. These chemical reactions produce interstellar complex organic molecules (iCOMs) that may be essential in the production of prebiotic molecules. The UV-driven chemistry in interstellar ices is studied with the Sublimation of Laboratory Ices Millimeter/submillimeter Experiment (SubLIME) technique, a laboratory setup that works at cryogenic conditions and ultra-high vacuum. Submillimeter rotational spectroscopy, quadrupole mass spectrometry, and Fourier-transform infrared transmission spectroscopy are used to monitor the products in both the solid and gas phases. A series of experiments were conducted to examine the impact of simultaneous UV photoprocessing and temperature programmed desorption (TPD) on simple interstellar ice analogs to simulate conditions more closely resembling the real conditions in dense molecular clouds or protoplanetary disks. Preliminary results indicate that the common assumption that equivalent UV fluences results in the same chemistry, regardless of total flux or duration, might be erroneous. Additional studies will further explore this chemistry in detail.