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LABORATORY SIMULATION OF THE PHOTOPROCESSING AND WARM-UP OF COMETARY AND PRE-COMETARY ICES: PRODUCTION OF COMPLEX ORGANIC MOLECULES

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The recent missions to Comet Halley detected large quantities of organic material on grains as well as organic molecules in the gas phase. A possible origin of these materials is the energetic processing of ice mantles on the grains prior to comet formation, either in the pre-solar nebula or the interstellar medium. We simulated this process in the laboratory by depositing interstellar ice analogs ($\text{H}_2\text{O}/\text{CH}_3\text{OH}/\text{CO}/\text{NH}_3$) on a cold (10 K) substrate with simultaneous UV irradiation. The material evaporating during warm-up of the photolyzed ice as well as the residue remaining at room temperatures was analysed by a number of techniques. It was found that a large number of organic molecules of various complexity are synthesized during the simulation process, stressing the possible significance of UV photolysis for producing the organic Comet material.