

Study of Amino Acids and Intermediate Species Produced from Irradiation of Astrophysical Ices

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Irradiation of ices of astrophysical interest (H_2O , CO , CO_2 , CH_3OH , CH_4 , NH_3 , etc.) with UV photons and energetic ions at low temperature, which mimic radiations in environments, such as the interstellar medium (ISM) and comets, are known to lead to the production of organic residues after warming the samples up to room temperature. Such residues can be analyzed and show the presence of a great variety of organic molecules such as amino acids (glycine, alanine, etc.). The main goal of these experiments is to study the different mechanisms of formation of such molecules from photo- and thermo-processing of ices in interstellar-like conditions, by tracing the production of amino acids and intermediate species (molecules, ions, radicals), known to be precursors of organic molecules. Some of them (HCO , HNCO , OCN^- , H_2CO , etc.) have already been observed in space in solid the gas phases. Amino acids are also detected in extraterrestrial material such as meteorites and interplanetary dust particles (IDPs), strengthening the importance and relevance of such laboratory simulations. Here we present the results obtained for ice mixtures irradiated in one the one hand with UV photons in the 4-20 eV energy range, from the synchrotron radiation of NSRRC in Hsinchu, Taiwan, and performed at the Department of Physics, NCU, Taiwan, with a H_2 discharge lamp, and on the other hand with 15 keV H_3^+ and He^+ ions. We list the molecules that are formed directly by photo-processing at low temperature and analyze the distribution of the amino acids detected in some organic residues.