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Amino acids produced by UV/EUV photon irradiation of interstellar ice analogues*

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Two experimental results will be presented in this work. The first one is focused on the formation of large molecules from most simple cosmic ice analogues [1] consisting of H_2O, CO_2 and NH_3 irradiated by extreme ultraviolet (EUV) photons. Icy samples were condensed on a KBr substrate mounted on a closed cycle helium cryostat kept at 16K. This ice analogue was photo-irradiated by EUV photons provided by the High-Flux beamline of National Synchrotron Radiation Research Center (NSRRC). After exposure to a 10^{20} photon dose, the sample was warmed up under dynamic vacuum kept below $1x10^{-7}$torr to room temperature. The residue left over on the substrate was then analyzed by a high performance liquid chromatography. Traces of a few amino acids were found in the residue, for example, glycine, serine, alanine..etc.[2,3]

The second one is focused on an exploration of EUV photolysis on naphthalene ($C_{10}H_8$), the smallest polycyclic aromatic hydrocarbon (PAH), mixed with water and ammonia ices. Two broad-band energy ranges provided by a synchrotron radiation light source in the ultraviolet/near extreme ultraviolet (4–20 eV) and the extreme ultraviolet (13–45 eV) regions were used for the irradiation of H_2O+NH_3+$C_{10}H_8$ = 1:1:1 ice mixtures at 15 K. We have identified several photon-products, namely CH_4, C_2H_6, C_3H_8, CO, CO_2, HNCO, OCN^-, and probably quinoline (C_9H_7N) and phenanthridine ($C_{13}H_9N$). We found that the light hydrocarbons are preferably produced for the

ice mixture subjected to 4–20 eV photons. Detailed ir spectra will be presented.

References:

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