STABILITY OF GLYCINE TO ENERGETIC PROCESSING UNDER ASTROPHYSICAL CONDITIONS INVESTIGATED VIA INFRARED SPECTROSCOPY

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Glycine, the simplest aminoacid, has been detected in comets and meteorites in our Solar System. Its detection in the interstellar medium is not improbable since other organic molecules of comparable complexity have been observed[a]. Information of how complex organic molecules resist the energetic processing that they may suffer in different regions of space is of great interest for astrochemists and astrobiologists.

Further to previous investigations[b] we have studied in this work, via infrared spectroscopy, the effect of 2 keV electron bombardment on amorphous and crystalline glycine layers at low temperatures, to determine its destruction cross section under astrophysical conditions. Energetic electrons are known to be present in the solar wind and in planetary magnetospheres, and are also formed in the interaction of cosmic rays with matter. Moreover, we have probed the shielding effect of water ice layers grown on top of the glycine samples at 90 K. These experiment aim to mimic the conditions of the aminoacid in ice mantles on dust grains in the interstellar medium or in some outer Solar System objects, with a water ice surface crust. A residual material, product of glycine decomposition, was found at the end of the processing. A tentative assignment of the infrared spectra of the residue will be discussed in the presentation.

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[a] E. Herbst and E. F. van Dishoeck, Annu. Rev. Astro. Astrophys. 2009, 47:427-480

[b] B. Maté, Y. Rodriguez-Lazcano, O. Gálvez, I. Tanarro and R. Escribano, Phys Chem Chem Phys, 2011, 13, 12268. B. Maté, I. Tanarro, M.A. Moreno, M. Jiménez-Redondo, R. Escribano, and V. J. Herrero, Faraday Discussions, 2014, DOI: 10.1039/c3fd00132f.