GLYCINE BOMBARDMENT BY ALPHA PARTICLE – DESTRUCTION CROSS SECTION DEPENDENCE WITH keV ENERGY AND TEMPERATURE

R. MARTINEZ

Federal University of Amapá (UNIFAP), Macapá/Amapá, Brazil

I. ULRICHSEN, E.F. DA SILVEIRA

Pontifical Catholic University (PUC-Rio), Rio de Janeiro/Rio de Janeiro, Brazil

Life may have originated on Earth from prebiotic molecules that arrived brought by extraterrestrial bodies. Fragments' analysis of Murchison meteorite suggests that it is made of Solar System (SS) primitive material before the beginning of nowadays terrestrial life. In the interior, 17 primary amino acids and 13 sugars were found [1]. Alternatively, space probes are launched periodically to collect samples looking for prebiotic material. Knowing that amino acids, building blocks of proteins, are fundamental in the composition of all organisms, the academic community suggests the possibility of an evolution theory with exogen principles. A major question is how the prebiotic material could survive billions of years in the interplanetary medium.

Considering that α particles with energy of about 1 keV are very abundant in the SS, this research aims to determine experimentally the glycine radioresistance, that is, its half-life under solar wind irradiation. Thus, the different radiation effects due to this interaction, like sputtering and radiolysis, will be studied.

Experiments were performed at the Van de Graaff Laboratory of PUC-Rio, Rio de Janeiro, Brazil, using a He^+ beam produced by a keV accelerator. Glycine films were prepared and irradiated by the He^+ beam ions, with energies of 0.5, 1.0, 1.5 and 2.0 keV. Infrared spectroscopy (FTIR) was used to analyze the irradiation effects. Experimental data show that Glycine destruction cross section depends on the beam energy and on sample temperature [2]. Fig. 1 shows the former dependence, indicating that at low energies, glycine absorbance decay faster that at lowers energies. Additionally, this research intends to find out if daughter molecules arise after Glycine irradiation with α keV particles.

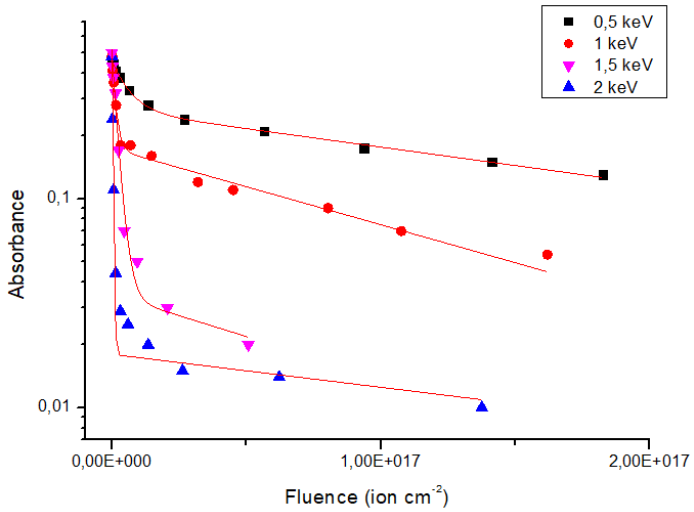

FIG. 1.Typical results of the normalized absorbance as a function of the fluence, for four different He^+ beam energies: 0.5, 1.0, 1.5 and 2.0 keV.

Keywords: Glycine, Irradiation, Destruction cross section, Origin of life

REFERENCES

[1] COOPER, G. et al. Carbonaceous meteorites as a source of sugar-related organic compounds for the early Earth. Nature 414 (2001) 879-83.

[2] SCHOU, J. et al. Erosion of solid neon by keV electrons. Physical. Review B 34 (1986) 93-106