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CHEMICAL EVOLUTION TO OLIGOPEPTIDE IN SOLID PHASE IRRADIATED WITH VACUUM ULTRAVIOLET LIGHT AND SOFT X-RAY.

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We determined quantum efficiencies of chemical evolution from glycyl-glycine (Gly)₂ to glycyl-glycyl-glycine (Gly)₃ and glycyl-glycyl-glycyl-glycine (Gly)₄ induced by 146 nm vacuum ultraviolet (VUV) and near oxygen K-edge soft X-ray irradiation, and in an attempt to examine the possibility of chemical evolution of amino acids and peptides on the surface of meteorites in space.

We determined photo-production quantum efficiency of Gly, diketopiperazine (dkp), (Gly)₃ and (Gly)₄ in (Gly)₂ solid to be $(2.8 \pm 0.1) \times 10^{-2}$, $(2.1 \pm 0.3) \times 10^{-4}$, 7×10^{-5} , $(4.3 \pm 0.3) \times 10^{-4}$ respectively for 146 nm VUV, and in the case of soft X-ray irradiation, the quantum efficiency of Gly, (Gly)₃, (Gly)₄ were determined to be 42 ± 2 , 0.5 ± 0.07 , more than 0.04 for 530 eV and 32 ± 5 , 0.4 ± 0.02 , more than 0.06 for 540 eV.

We concluded less reactive steps have advantage in chemical evolution and secondary electron chain reaction is mainly in soft X-ray region. We suggested that the chemical evolution to oligopeptide occurred to use wide range energy in the space.