RADIOLYSIS AND THERMOLYSIS OF GLYCOLALDEHYDE IN CONDITIONS SIMULATING THE VICINITY OF A SUBAERIAL HOT SPRINGS IN THE PRIMITIVE EARTH.

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Introduction: Carbohydrates are organic molecules with minimal formula $(CH_2O)n$. They are essential for the actual biological systems [1,2], since these molecules can serve as 1) energetic molecules, since they are part of the molecules of ATP, GTP, etc. 2) structural molecules, as in nucleic acids, (e.g. ribose-5-phosphate in DNA and RNA), and 3) precursor for more complex sugars. Some of them have been detected in the Interstellar Medium (e.g. glycolaldehyde) [3], that is of great relevance in the period of chemical evolution on Earth

It has been proposed, that the sugars were the first prebiotic auto-catalytic systems [1]. For all these reasons, the synthesis and stability of these compounds under primitive conditions is essential.

Geological environments, where the scenery for chemical reactions that enriched the Earth with organic matter were developed.

It has been proposed that in subaerial hydrothermal systems such as Yellowstone (common and widely distributed in primitive Earth) [4], nucleotide monomers could have been synthesized in the hydration-drying processes, and even these monomers could be polymerized through heterogeneous catalysis [5].

The objective of the present work is to study the thermolysis and gamma radiolysis of glycolaldehyde, in solid state, in aqueous solution, and suspensions with clays, simulating the vicinity of a subaerial hot spring probable in the primitive Earth.

The results highlighted the reactivity of the sugars since they were determined to be labile to ionizing radiation and heat, even in the presence of mineral surfaces. Among the products obtained in the radiolysis processes of glycoladehyde, other sugar-type compounds were determined (e.g. eritriol). The chemical analysis was performed by ATR-FTIR, Liquid Chromatography-UV Spectroscopy (UHPLC-UV) and HPLC Coupled to mass spectrometry (UHPLC-MS).

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