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# Radiation chemistry approach to the study of sedimentary microenvironments as models for the protection of bio-organic molecules on the early Earth

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Studies in radiation chemistry can provide a deeper insight into the chemical process that may have importance for chemical evolution studies that led to the origin of life. Chemical evolution encompasses the physical and chemical aspects that try to explain the origin/permanence of bio-organic compounds prior the appearance of life.
Our aim is to stress the relevance of ionizing radiation as a tool for the study of formation/destruction of bio-organic compounds such as nucleic acid components. Also to remark the importance of chemical reactions that occurs at the hydrosphere/lithosphere interfaces, and study if solid surfaces can protect the organic compound adsorbed in the clay.
On the other hand, it is conceivable that nucleic acids components or their precursors appeared at early stage in the evolution of this planet. Nucleic acid bases and their derivatives are important compounds in biological systems. Their synthesis and stability in environmental conditions is of paramount importance in chemical evolution. To ensure that organic compounds endured in the primitive Earth there are several possibilities: a) their synthesis was continuous and they reach steady state concentration; b) the compounds present a long half-life in the environmental conditions of the primitive Earth; c) solid surfaces protect the organic compound adsorbed in the clay. To this end, we determine the survival of bases and their corresponding nucleosides exposed to a high radiation field in an aqueous solution and adsorbed in a clay mineral.
We have studied five nucleosides (cytidine, uridine, adenosine, guanosine and xanthosine) in simulated primitive Earth conditions. These samples were irradiated adsorbed in Na-montmorillonite (a clay mineral). Using X-ray diffraction, UV-Vis spectrophotometry and HPLC, the hypothesis of the protective role of solid surfaces like clay for organic compounds adsorbed on them, when exposed to external sources of ionizing radiation (γ-ray), was proved.

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