

RADIOLYSIS AND TERMOLYSIS OF TETRADECANOIC ACID AND DOCOSANOIC ACID IN PHYSICOCHEMICAL CONDITIONS SIMILAR TO HYDROTHERMAL VENTS.

J. Cruz-Castañeda^{1,3}, A. Negrón-Mendoza^{1*}, S. Ramos-Bernal¹, M. Colín-García², and A. Heredia¹.

¹Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México, UNAM. Cd. Universitaria, A. P. 70-543, 04510 México, CDMX, México.

²Instituto de Geología, Universidad Nacional Autónoma de México, UNAM.

³Programa de Maestría y Doctorado en Ciencias Químicas, UNAM. Cd. Universitaria, A. P. 70-543, 04510 México, D. F. México.

*negrón@nucleares.unam.mx

Introduction: Carboxyl acids are important compounds in biological systems, and their stability to diverse physicochemical conditions present in various environments probable in the primitive Earth is of paramount importance [1]. A proposed geological environment in which it could carry out significant reactions for the synthesis of compounds of pre-biological importance are the hydrothermal vents [2].

This research focuses on the study of the stability of tetradecanoic acid and docosanoic acid, as examples of high molecular weight fatty acids. These compounds were exposed to high temperatures, in addition to the presence of a gamma radiation field. It is probably that both energy sources may have been present near hydrothermal vents. To this end, the molecules were irradiated with gamma rays in oxygen-free aqueous solutions, and the thermal decomposition was studied in a static system at temperatures up to 90°C, simulating a white hydro-thermal vent. The analysis of these systems was performed by ATR-FTIR spectroscopy and gas chromatography (GC) and GC-coupled to a mass spectroscopy.

Our results show the relative stability of these carboxylic acids under different energy sources. Additionally, the reaction products may have importance in the chemical evolution, since they could function as reagents towards the synthesis of other compounds of pre-biological importance [3].

References:

- [1] Deamer, D.W. (2008) *Nature*, 454 (7200), 37-38.
- [2] Wächtershäuser, G. (1997) *J. Theor. Biol.*, 187(4), 483-494.
- [3] Cruz-Castañeda, J. (2014), *AIP Conference Proceedings*, 1607(1), 104-110.