

Catalysis and the emergence of the RNA world

JAMES P FERRIS¹, WENHUA HUANG¹, PRAKASH JOSHI¹, SHIN MIYAKAWA², STEFAN PITSCHE³ AND KONG-JIANG WANG⁴

¹Department of Chemistry and NY Center for Studies on the Origins of Life, Rensselaer Polytechnic Institute, Troy, NY 12180, USA (Ferrij@rpi.edu)

²Department of Basic Medical Science, Institute of Medical Science, University of Tokyo, Tokyo 108-8639, Japan (shin@ims.u-tokyo.ac.jp)

³Institute de Chemie Organique, Ecole Polytechnique Federal de Lausanne, EPFL-BCH, 1015 Lausanne, Switzerland (stefan.pitsch@epfl.ch)

⁴National Key Laboratory of Macromolecules. Institute of Biophysics, Chinese Academy of Sciences. Beijing, 100101 (wangkj@moon.ibp.ac.cn)

Life based on RNA is postulated to have been an early stage in either the origin or early evolution of life on Earth. It is proposed that mineral and/or metal catalysis had a central role in prebiotic synthesis. This important role of catalysis will be illustrated from the results of our studies on the synthesis of RNA from activated RNA monomers in reactions catalyzed by montmorillonite clay. The formation of RNAs containing 35-40 monomer units will be described. In addition, the role of catalysis in the selectivity in the formation of RNA and in the formation of homochiral oligomers from D,L-mixtures will be discussed.

References

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A laboratory investigation of the photochemical generation of a polymeric haze in Titan's atmosphere

JAMES P. FERRIS¹, BUU TRAN¹, JEFFREY JOSEPH¹, VERONIQUE VUITTON¹, PETER PERSANS² AND JOHN CHERA³

¹ Department of Chemistry and NY Center for Studies on the Origins of Life, Rensselaer Polytechnic Institute, Troy, NY 12180, USA (Ferrij@rpi.edu)

² Department of Physics, Rensselaer Polytechnic Institute, Troy, NY 12180-3590

³ GE Global Research Center, One Research Circle, Niskayuna, NY 12309

The atmosphere of Titan, the largest moon of Saturn, consists of 98 % nitrogen, 1.5 % methane and much smaller amounts of hydrogen, acetylene, ethylene, ethane, hydrogen cyanide, cyanoacetylene and other trace constituents. Titan has a haze that is formed by the photolysis of the compounds in its atmosphere. The UV photolysis of a mixture of gases that approximates compounds in Titan's atmosphere was used to simulate chemical processes there. Volatile products and a solid polymer formed. UV, visible, infrared spectra and x-ray photoelectron spectroscopy were used to characterize the solid product. The value of the complex refractive index (real and imaginary parts) were determined and compared with those measured for Titan's haze. These values were compared with analogs formed in discharge reactions. The data obtained from this research will be used to analyze the data from a probe that will descend through Titan's atmosphere in 2005.