

Photochemical synthesis of Amino Acid from Nitrous Oxide on Early Mars

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Recent studies suggest that early Mars may have been a clement environment for emergence of life. The geological evidence suggests that liquid water was present transiently on early Mars. Organic molecules as wells as nitrogen-bearing compounds have been discovered on Mars, hence the building block of life including amino acids may have been produced on early Mars. We report results of new experimental study on nitrogen photochemistry driven by UV started from the initial gas containing CO and N₂O, which could possibly exist in the atmosphere on early Mars because of the low oxygen fugacity of Martian mantle. The results demonstrated that carboxylic acids, ammonia, methylamine, as well as amino acids were produced under the presence of water. The product amino acids include glycine, serine and β -alanine when UV was penetrated to the surface of liquid water. The results suggest that NH₃ can be synthesized by photochemistry in the atmosphere containing N₂O+CO+H₂O, and could be an important intermediate to synthesize the amino acid.

Keywords: synthesis of amino acids, atmospheric photochemisry, early Mars