

## Polymerization of amino acids in marine sediments of the early Earth: importance of pressure

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Peptide formation is the first step for the formation of protein. On the other hand, it is completely unknown as to where peptide formed on the early Earth. Peptide formation postulate heat energy, but heat energy alone also decomposes amino acids. Such thermal effects may be controlled by pressures. Therefore, polymerization experiments of amino acids were performed using autoclave changing pressures (1-150 MPa) and temperatures (100-175 C degree). Alanine, glycine, valine and aspartic acids were used. Products were analyzed using HPLC and LC-MS.

Results indicate that: (1) glycine was polymerized up to 11-mers; (2) valine was polymerized up to 3-mer in particular with a help from clays; and (3) aspartic acids were polymerized more than 4-mer. Importance of pressure effects was suggested from all experiments to polymerize amino acids. Therefore, inside of deep marine sediments, where pressures and temperatures were available, would be suitable for the peptide formation on the early Earth.