

Study of amino acid in the hydrothermal condition - In-situ DAC experiments at low pressure, and low temperature condition-

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Amino acids are organic compounds that form the fundamental part of life. Proteins are formed by peptide binding and polymerization of amino acids. Amino acids can be polymerized in the ridge hydrothermal field. Therefore, it has been considered that the ridge hydrothermal activity might have played an important role for the origin and evolution of life. Previous hydrothermal experiments were done using cold sealed hydrothermal bombs and auto claves. Therefore the quenched run charges were observed after high P, and T experiments. In order to perform in-situ observation of the amino acids at high P and T condition, we have conducted diamond-anvils cell (DAC) experiments with laser-Raman analysis. Our preliminary experiments show that glycine is stable at 1 GPa, 100 °C, and 1 GPa, 50 °C, with a negative P/T slope boundary. Above the stability field boundary, it is decomposed to methylamine, CO₂ and so on. The present study also shows that diglycine is stable much higher T conditions, 200 °C at 1 GPa. The present study concludes that the glycine can be stable in deeper part of cold hydrothermal field such as serpentinized mantle beneath the Lost city or Enceladus. The polymerized diglycine is also possible to stay in circulation of the cold hydrothermal zone.

Keywords: amino-acid, hydrothermal condition, DAC experiment