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Chirality change of valine by marine bolide impacts

TAKASE, Atsushi[1*], SEKINE, Toshimori[1], FURUKAWA, Yoshihiro[2], KAKEGAWA, Takeshi[2], Takamichi Kobayashi[3], NAKAZAWA, Hiromoto[3]

[1]Graduate School of Science, Hiroshima University, [2]Graduate School of Science, Tohoku University, [3]National Institute for Materials Science

The chirality of terrestrial amino acids consisting of biomolecules is only L-type. In order to make clear the origin of life from the standpoint that biomolecules are formed by oceanic impacts of meteorites, it is crucial to determine the chirality change of amino acids through impact process that have been considered to have occurred at early Earth. Each aqueous solution (˜100 mmole/l) of L- and D-valine was prepared separately and used as reactants. Samples after shock recovery experiments on mixtures of powdered olivine and the solution were analyzed by LC/MS for the contents of L- and D-valines. The present results indicate that valine survives significantly (˜10%) and that the aqueous L- and D-valines transform partially (˜5%) to D- and L-valines, respectively. Although further studies need to define how the final chirality changes by shock processes, marine bolide impact may have significant effects on the chirality and the chemical evolution of biomolecule.