

Poster Presentation

BM.P28

Influence of crystallization on formation of biomolecular homochirality on Earth

K. Konstantinov¹, A. Konstantinova¹

¹*Institute of Crystallography, RAS, Moscow, Russia*

A mathematical model of coupled autocatalytic reactions along with crystallization of diastereomers was considered. It was shown that the differences in the physical properties of diastereomers could be a 100% enantioselective factor, which makes it possible to obtain a significant chiral polarization even at low enantioselectivity of autocatalysis. It was shown that molecules, which are more complex, should have higher chiral polarization than simpler ones. The calculation of the dynamics of the model under consideration shows that the presence of binomial coefficients in the reaction of pair formation from two different enantiomers leads to the occurrence of an additional 100% enantioselective factor even in case when diastereomers have identical properties. Estimates show that theoretical difference between right and left-handed molecules (which is due to weak interaction), is sufficient to explain directed symmetry breaking and construction of biological molecules from L-amino acids and D-sugars at the origin of life on Earth. It is shown that such a model constitutes an amplifier with a feedback. It is proposed that a two-layer system with a feedback could be attributed to the formation of longer homochiral chains, which are necessary for the formation of life on Earth.

Keywords: homochirality, crystallization, autocatalysis