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The macroscopic coherence in synchronized chemical and biochemical reactions: The way to the self-organizing chemical systems

Chemistry is on the brink of establishing the self-organizing chemical systems where algorithms, allowing a group of various chemical reactions to combine in an ensemble in order to obtain the final product in a single reaction medium with high selectivity in a short time, are implemented. The synthesis of a target biochemical product in the living organisms at the cellular level is carried out practically in no time, and this is possible only in conditions of the coherent synchronized reactions, which represent the ensemble of the chemical reactions at the cellular level. Unfortunately, these reactions haven't been practically implemented in the chemistry as a model system, probably due to the lack of the adequate theories explaining working principles of enzyme ensembles (unlike the working principles of individual enzymes). Developed macroscopic theory of coherent synchronized chemical reactions has been adequately corroborated by experimental studies. Here we propose an experimentally corroborated model of coherent synchronized reactions and its mathematical apparatus, consisting of the determinant equation and coherent correlation. Thus, self-organization of an ensemble of reactions capable of being intensified and weakened simultaneously and, therefore, inducing macroscopic coherence, may be suggested as the basis for the principle by which many enzymatic ensembles are organized.

Biography

Tofik Nagiev is a vice-president of Azerbaijan National Academy of Sciences, Director of Research Center of Azerbaijan National Encyclopedia and Department chief of Nagiev Institute of Catalysis and inorganic chemistry of ANAS. The professor of the department of the physical and colloid chemistry of Baku State University.

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