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# Biomaterials 2019: New approaches to simulation of enzymatic reactions: mimetic catalysis

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## Abstract

The area between enzymatic and chemical catalyses, associated with simulation of biochemical processes by their basic parameters, is accepted as mimetic catalysis. The key aspect of mimetic catalyst is diversity of enzyme and biomimetic function processes, which principally distinguishes the mimetic model from traditional full simulation. Basing on the analysis of conformities and diversities of enzymatic and chemical catalysis the general aspects of mimetic catalysis are discussed. Idealized model of biomimetic catalyst and the exclusive role of the membrane in its structural organization are considered. The most important achievements in the branch of catalysis are shown, in particular, new approaches to synthesis and study of biomimetic catalase, peroxidase and monooxidases reactions. The catalysis direction, originated from simulation of biochemical processes, is suggested to call the ???mimetic catalysis???. Mimetic catalysis designs a real model (a mimic) which simulates objects and processes of enzymatic catalysis by their basic (but deficient) characteristics (selectivity, condition mildness, active site action mechanism etc.). Since only definite properties of enzyme are simulated, it does not pretend to completeness of enzyme description, though optimal parameters by some properties may be approached. The mimetic model of enzyme helps in synthesizing suitable catalysts using inaccurate and sometimes ambiguous information. The overwhelming majority of biomimetics operate in liquid. Their activity depends on the origin of solvents, reaction mixture and cell effects. Gas phase oxidation processes are less dependent on these effects and in the first approximation can be considered as oxidation under quasi-ideal conditions. It goes without saying that enzymatic reactions do not proceed in gases. However, it is possible to simulate catalytic functions in the gas phase. However, it is possible to simulate catalytic functions in the gas phase. This simplifies the decoding of the reaction mechanism, not complicated by factors accompanying the liquid-phase oxidation.

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