

Molecular Modeling of the Lipase Catalyzed Reaction Mechanism Using QM/MM Methods

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Quantum chemical and molecular dynamic investigations have been performed on model systems for *Candida rugosa* lipase (CRL) to study mechanical and conformational features of the catalytic reaction. By performing the MD simulations using the Discovery Studio® Modeling 1.1(Accelrys Inc.) program, the useful information about reaction mechanism can be obtained from the analysis of the trajectories and histograms.

The enzyme reaction mechanism is an important factor in design and operating such processes. Molecular modeling using computer as well as an experimental study was carried out due to difficulties of finding the transition state of reaction and calculating energy of an intermediate.

In this study, Molecular dynamic simulations have been carried out on lipase with (\pm)-cis- 4-acetamido-cyclopent-2-ene-1-carboxylic esters as substrates. These esters serve as precursors for the synthesis of aristeromycin, the carbocyclic analogue of adenosine. As a result, the experimental and simulation result were compared for significant hydrogen bonds in the active site of the enzyme. Besides, the enantioselectivity of lipase was discussed in the enzyme catalytic reaction.