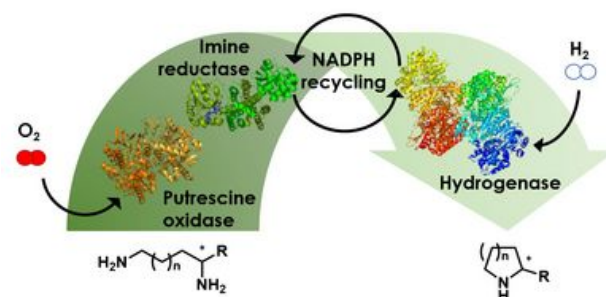


Synthesis of N-heterocycles from diamines via H₂-driven NADPH recycling in presence of O₂

Start Time: Wednesday, January 30, 2019

End Time:



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Ammar Al-Shameri, Niels Borlinghaus, Leonie Weinmann, Philipp N. Scheller, Bettina M. Nestl and Lars Lauterbach

Enzymatic cascades enable the regioselective and stereoselective synthesis of fine chemicals and pharmaceuticals in a series of coupled reactions, which is of core interest of UniSysCat. In a joined collaboration, the groups of Lauterbach and Nestl designed an enzymatic cascade for the H₂-driven synthesis of nitrogen-heterocycles. Saturated nitrogen-heterocycles, especially pyrrolidines and piperidines, are attractive scaffolds for agrochemicals and pharmaceuticals. The newly developed enzymatic cascade included an O₂-dependent putrescine oxidase, a NADPH-dependent imine reductase and an O₂-tolerant NADP⁺-reducing hydrogenase. The incorporation of a hydrogenase made the reducing power of H₂ available for biosynthesis. Enzyme engineering approaches were combined to optimize the specificity and activity of the putrescine oxidase from *Rhodococcus erythropolis* for the transformation of substituted diamines to the corresponding pyrrolidines and piperidines. The one-pot reaction resulted in up to 97% product formation. Furthermore, high selectivities up to 93% ee were obtained by exploiting the kinetic resolution of the putrescine oxidase. The prevention of organic solvents, toxic compounds or purification of intermediates demonstrates the “greenness” of this approach.

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