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Highly Efficient Asymmetric Reduction of Arylpropionic Aldehydes by Horse Liver Alcohol Dehydrogenase through Dynamic Kinetic Resolution
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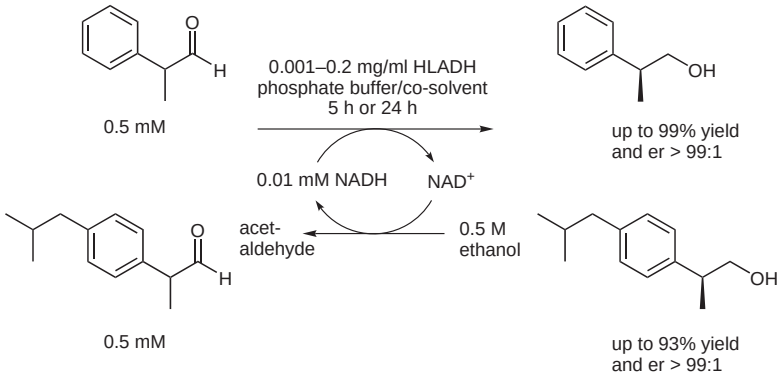
Arylpropionic Alcohols via Enzyme-Mediated Dynamic Kinetic Resolution



Significance: The authors report their preliminary studies on the reduction of two 2-arylpropionic aldehydes to enantioenriched alcohols via a dynamic kinetic resolution. The enzyme catalyst is commercially available horse liver alcohol dehydrogenase (HLADH), with NADH as a cofactor. Since the enzyme regenerates its cofactor in the presence of ethanol, substoichiometric amounts of NADH are sufficient. It was found that organic cosolvents tetrahydrofurane and acetonitrile, which increase the solubility of the starting material, are tolerated in up to 10 vol% with respect to the buffer solution. With a change in the protocol, almost pure hexane (up to 99 vol%) can also be tolerated as solvent.

Comment: The dynamic kinetic resolution is a powerful tool to convert a starting material into an enantioenriched or even enantiopure product, theoretically in 100% yield, which is a distinct advantage over kinetic resolution methods. The catalyst in this reaction proves to be 'multitasking': Not only does it perform the reduction of the aldehyde, but there is also no need for adding a special racemization catalyst, and it recycles NADH by oxidizing ethanol and reducing NAD^+. This greatly lowers the amount of expensive NADH employed in the reaction.

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