BIOCATALYTIC STEREOSELECTIVE ACYLOIN CONDENSATIONS

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It is well known that chemical synthesis of enantiopure chiral compounds is often a difficult task, while the use of enzymes from microorganisms can provide a much more favorable approach.

The biocatalytic synthesis of unsymmetrical chiral acyloins as intermediates in the production of active pharmaceutical ingredients has been an attractive goal since the first stereoselective condensation of benzaldehyde and pyruvate catalyzed by fermenting brewer's yeast to produce *R*-(-)-phenylacetylcarbinol, an important precursor in the production of pseudoephedrine[1].

In the case of α-hydroxy ketones or acyloins, the use of pyruvate decarboxilase (PDC, E.C.4.1.1.1), a Mg(II) and thiamine diphosphate-dependent enzyme from yeasts as a biocatalyst has been extensively studied and is now a well-recognized method of transforming aldehydes in their corresponding acyloins[2]. When using whole cells systems to accomplish the biotransformation of aldehydes, one of the greatest challenges is inhibition of by-products formation, especially alcohols that are generated by the reductases present in the cells. This problem can be overcome by screening of different microorganism for high PDC activity and also by optimization of reaction conditions like pH, temperature, reaction time and use of additives[3].

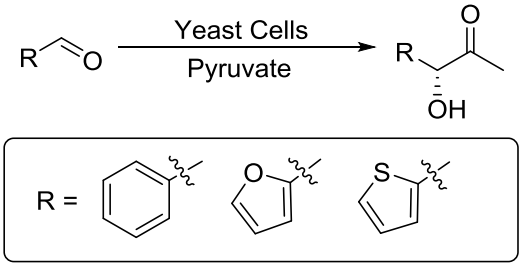

Figure 1: Biocatalytic acyloin synthesis

Herein the stereoselective acyloin condensation of aromatic and heteroaromatic aldehydes using whole cells systems in aqueous media is presented (Fig.1). The main purpose of the present work has been the screening of newly isolated yeast strains for their pyruvate decarboxylase activity and optimization of reaction conditions for maximum production of acyloins.

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