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Study of two new DHA aldolases from acidophilic organisms

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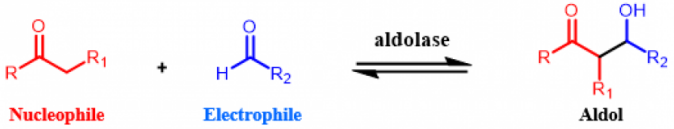
PURPOSE OF THE ABSTRACT
Biocatalysis is a tool to access new products of interest in a greener and more eco-friendly way. It allows us to respond to many current issues related to the 12 principles of green chemistry. In this context, Aldolases are C-C bond forming enzymes of particular interest for synthetic applications. Indeed, the aldol reaction allows to generate up to 2 asymmetric centers, providing chiral adducts. Depending on the aldolases used, the stereochemistry of these asymmetric centers can be controlled [1]. Fructose-6-phosphate aldolase (FSA) belonging to class I aldolases, was discovered in E. coli by Shürmann and Sprenger[2] in the 2000s. It was demonstrated as the first aldolase able to use hydroxyacetone[3], as nucleophile substrate, and furthermore particularly robust, efficient and versatile towards other nucleophiles such as dihydroxyacetone, hydroxybutanone[4] and glycolaldehyde[5]. These discoveries were the basis for mutagenesis[1] work or for the search from biodiversity for new aldolases presenting for example different stereochemistries. In the framework of our collaboration with the Génoscope (Evry), two FSA from acidophilic organisms are studied, one from, Acidobacteria Bacterium (A0A399XV01) and one from Acidiplasma Aeolicum (A0A0Q0RVA3). These catalysts have revealed atypical properties. Molecular modeling and their kinetic constants determination helped their characterization. These results will be presented here, as well as some synthetic applications.

FIGURES



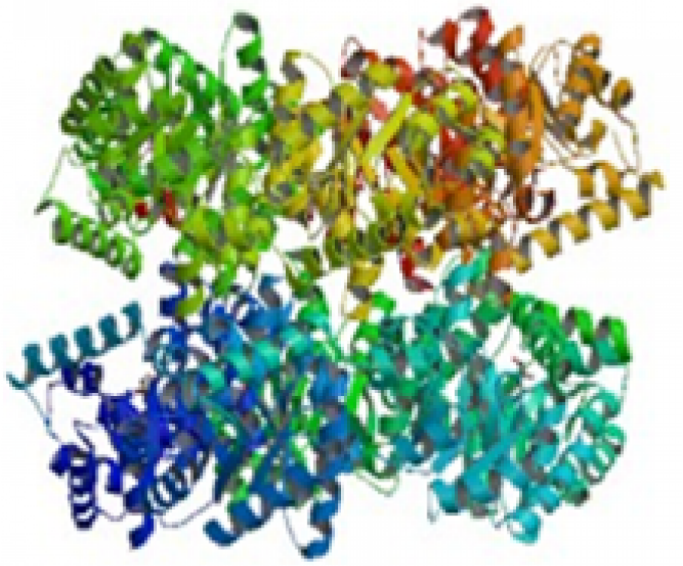


FIGURE 1
Aldolisation reaction catalysed by aldolase
Aldolisation reaction catalysed by aldolase

FIGURE 2
FSA : Decameric structure
FSA : Decameric structure

KEYWORDS
Biocatalysis | C-C bond formation | Biodiversity | extremophilic organisms

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