Production of L-Ribose from L-Ribulose by a Triple-Site Variant of Mannose-6-Phosphate Isomerase from Geobacillus thermodenitrificans

https://www.researchgate.net/publication/221976327
DOI: 10.1128/AEM.07012-11

Cited in:

Applied and Environmental Microbiology 78(11):3880-4, 2012
Production of L-Ribose from L-Ribulose by a Triple-Site Variant of Mannose-6-Phosphate Isomerase from Geobacillus thermodenitrificans
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Accepted 16 March 2012, Published 23 March 2012

Abstract:

A triple-site variant (W17Q N90A L129F) of mannose-6-phosphate isomerase from Geobacillus thermodenitrificans was obtained by combining variants with residue substitutions at different positions after random and site-directed mutagenesis. The specific activity and catalytic efficiency (kcat/Km) for l-ribulose isomerization of this variant were 3.1- and 7.1-fold higher, respectively, than those of the wild-type enzyme at pH 7.0 and 70°C in the presence of 1 mM Co2+. The triple-site variant produced 213 g/liter l-ribose from 300 g/liter l-ribulose for 60 min, with a volumetric productivity of 213 g liter−1 h−1, which was 4.5-fold higher than that of the wild-type enzyme. The kcat/Km and productivity of the triple-site variant were approximately 2-fold higher than those of the Thermus thermophilus R142N variant of mannose-6-phosphate isomerase, which exhibited the highest values previously reported.

Reference:

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