

催化、动力学与反应器

重组甲酸脱氢酶对合成1,3-丙二醇的促进作用

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摘要 在甘油厌氧发酵生产1,3-丙二醇的过程中,需要消耗还原当量NADH,NADH的有效供给决定了1,3-丙二醇的产量。本文从Candida boidinii基因组DNA中克隆了甲酸脱氢酶基因fdh,利用表达质粒pMAL TM-p2X-fdh转化到1,3-丙二醇生产菌 Klebsiella pneumoniae YMU2中,构建了具有NADH再生系统的重组菌 Klebsiella pneumoniae F-1。在5 L发酵罐培养中,F-1合成1,3-丙二醇浓度和产率分别达到了78.6 g·L⁻¹和1.33 g·L⁻¹·h⁻¹,分别比YMU2提高了12.5%和41.2%。根据F-1和YMU2菌株的主要代谢产物的生成情况比较了二者的代谢流分布。

关键词 [1,3-丙二醇](#); [Klebsiella pneumoniae](#); [甲酸脱氢酶](#); [NADH](#); [Candida boidinii](#)

分类号

Improvement of 1,3-propanediol production by recombinant formate dehydrogenase in Klebsiella pneumoniae

Abstract

Biosynthesis of 1,3-propanediol from glycerol by Klebsiella pneumoniae was associated with the consumption of NADH, which was generated/regenerated in the oxidative branch pathway of glycerol in vivo. The availability of NADH would be critical for the final yield of 1,3-propanediol. Formate dehydrogenase gene(fdh) was cloned from Candida boidinii genome and was then transformed into Klebsiella pneumoniae YMU2 by constructed expression vector pMAL TM-p2X-fdh to generate recombinant Klebsiella pneumoniae F-1. Compared with K. pneumoniae YMU2, the yield of 1,3-propanediol and production rate of recombinant F-1 were 78.6 g·L⁻¹ and 1.33 g·L⁻¹·h⁻¹, increased by 12.5% and 41.2%, respectively. The metabolic flux of strain YMU2 and recombinant F-1 was analyzed with the formation of main metabolites.

Key words [1,3-propanediol](#) [Klebsiella pneumoniae](#) [formate dehydrogenase](#) [NADH](#) [Candida boidinii](#)

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