

生物制造不同立体构型2,3-丁二醇: 合成机理与实现方法

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摘要 总结了不同 2,3-丁二醇立体异构体的生物合成机制, 以及有利于这些立体异构体高效合成的一些策略, 包括构建全细胞催化剂及利用合成生物学技术重建代谢途径等先进方法; 同时指出, 未来的研究重点是进一步利用合成生物学的方法, 以提高不同立体构型 2,3-丁二醇的生物合成能力, 并建立这些异构体高效可行的分离方法。

关键词: 2,3-丁二醇 立体构型 合成机理 全细胞催化 合成生物学

Abstract: 2,3-Butanediol, an important fine chemical, has been widely used in many areas. Containing two chiral centers, the molecule of 2,3-butanediol contains three stereoisomers, namely (S,S)-, (R,R)-, and meso-2,3-butanediol, which are especially crucial in providing chiral groups for the synthesis of fine chemicals and high-value pharmaceuticals. In this review, the synthetic mechanisms of different 2,3-butanediol stereoisomers are firstly revisited. Some strategies for efficient and economical pure 2,3-butanediol stereoisomers production, including constructing whole cell biocatalysts and constructing metabolic pathways using the emerging synthetic biology methods, are summarized. It is also pointed out that the focus of future research should be placed on improving the biosynthetic capability of different stereo-isomers using the synthetic biology methods, and establishing efficient downstream separation methods for economical 2,3-butanediol stereoisomers recovering process.

Keywords: 2,3-butanediol, stereoisomer, synthetic mechanism, whole cell catalysis, synthetic biology

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