生物化学工程与技术

维生素E琥珀酸酯的酶促合成及优化

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摘要

在有机溶剂中以维生素E和琥珀酸酐为底物在脂肪酶的催化下合成了维生素E琥珀酸酯。首先对酶促反应的脂肪酶、反应介质和反应温度进行了考察，在所选的几种脂肪酶中，假丝酵母脂肪酶（*Candida* sp.）的催化活性最好；叔丁醇和DMSO组成的混合溶剂(体积比为2∶3)为最合适的反应介质；30℃为适宜的反应温度。并采用Box-Behnken实验设计和响应面因子分析法对底物摩尔比等其他反应条件进行了优化。维生素E琥珀酸酯最优反应条件为：维生素E浓度0.26 mmol·ml^{-1}，维生素E和琥珀酸酐摩尔比1∶5，在5 ml叔丁醇和DMSO混合溶剂(体积比为2∶3)中，30℃下在0.02 g *Candida* sp.脂肪酶的催化下反应71 h，维生素E琥珀酸酯产率达到98.71%。

关键词

维生素E琥珀酸酯　脂肪酶　维生素E　合成

分类号

Optimized enzymatic synthesis of vitamin E succinate in organic solvents

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Abstract

Vitamin E succinate was synthesized via acylation of vitamin E with succinic anhydride using *Candida* sp.lipase as catalyst.The effects of enzyme sources，organic media and reaction temperature on the reaction yield were investigated.The results showed that *Candida* sp.lipase was the best lipase，the mixture of *tert*-butanol and DMSO (2∶3，vol) was the most suitable media for the reaction，and the appropriate reaction temperature was 30℃.Response surface methodology (RSM) and three-level-three-factor Box-Behnken design were used to evaluate the effects of other synthesis parameters，such as reaction time，substrates concentration and the molar ratio of vitamin E to succinic anhydride on the yield of vitamin E succinate.By solving the quadratic regression model equation using appropriate statistic methods，the optimum synthesis conditions were as follows：reaction time 71 h，vitamin E concentration 0.26 mmol·ml^{-1}，vitamin E to succinic anhydride molar ratio 1∶5.The predicted value of the vitamin E succinate yield was 99.27%.The actual experimental value 98.71% was in good agreement of the predicted value.

Key words

vitamin E succinate　lipase　vitamin E　synthesis

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