Optimization of Enzymatic Synthesis of Phytostanyl Ester by Response Surface Methodology

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ABSTRACT

Phytosterols (Plant sterol) are members of the “ triterpene ” family of natural products, which includes more than 100 different phytosterols and more than 4000 other types of triterpenes. Recently, phytosteryl ester have been found to be effective in lowering plasma cholesterol concentration by inhibiting the absorption of cholesterol in the small intestine. Therefore, phytosteryl esters are frequently added to cooking oil and function food. Traditionally, it has been isolated from natural sources or produced by chemical synthesis. Nowadays, people focus more on natural products for health benefits. Therefore, the biosynthesis of such esters by lipase-catalyzed chemical reactions under mild conditions has become more attractive to modern industries. The present work focuses on the ability of lipase from Candida rugosa (Lipase AY) to catalyze the esterification of sitostanol with butyric anhydride. Response surface methodology (RSM) and five-level-four-factor central composite rotatable design (CCRD) were adopted to evaluate the effects of synthesis variables, such as reaction time (2 – 10 h), temperature (25 – 65 oC), substrate molar ratio (1 – 3; Acyl noner/Alcohol), enzyme amount (10 – 50%w/w, by wt. of sitostanol) on percentage molar conversion of sitostanyl butyrate. The results showed that sitostanyl butyrate can been successfully synthesized by Lipase AY in solvent system. The optimum molar conversion of sitostanyl butyrate was 54.4% at 6.2 h、28.8 oC、41.6% enzyme amount and substrate molar ratio of 2

Keywords : biocatalysis ; lipase ; optimization ; phytostanyl esters ; Response Surface Methodology

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