Optimization of Lipase-Catalyzed L-Ascorbyl Laurate by Response Surface Methodology

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ABSTRACT

The oxidation of ascorbyl esters are widely used in food industry, cosmetics and medical hygiene. Because L-ascorbic acid is hydrophilic antioxidant, it is not easy to preserve. This work utilized solvent engineering, used lipases Novoyme?435 in direct esterification to study on solvent polarity influence productive in ascorbyl laurate, utilized n-Hexane, 2-methyl-2-butanol (2M2B)and acetonitrile were used as solvent composite blends, and each solvent composite was form 0-3 mL. Mixture Response Surface Methodology and Triangular contour plots were used to observe solvent polarity influence products in lipase-catalyzed ascorbyl laurate. Response surface methodology (RSM)and five-level-four-factor central composite ratatable design (CCRD)were adopted to evaluate the effects of synthesis variables, such as reaction time (2-10 hr), temperature (25-65 ?C), substrate molar ratio (alcohol:fatty acid = 1:1-1:5), and enzyme amount (5-25 mg), on percentage molar conversion of ascorbyl laurate. The results showed, ascorbyl laurate was at nearly polar organic solvent reaction system (2M2B and acetonitrile), conversion reached to 50.00%. At non-polar organic solvent reaction system (n-hexane), conversion only reached to 30.00%. When solvent was acetonitrile, conversion reached to 86.50% of ascorbyl laurate. The optimum conditions of ascorbyl laurate synthesis was: reaction time 8hr, temperature 40 ?C, substrate molar ratio 1.0:4.5 (alcohol:fatty acid), enzyme amount 20 mg, and the highest yield was 78.44%.

Keywords : Solvent engineering ; Ascorbyl esters ; Mixture design ; Response Surface Methodolog

Table of Contents

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