

Solvent Polarity Influence on Product Selectivity of Lipase-Catalyzed Glycerolysis by Mixture Response Surface Methodology

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ABSTRACT

This work utilized solvent engineering, used lipases IM 77 and Novoyme 435 in glycerolysis and interesterification to study on solvent polarity influence productive selectivity of monoacylglycerols and diacylglycerols, utilized n-Hexane, 2-methyl-2-butanol (2M2B) and octane 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 observed solvent polarity influence products selectivity in lipase-catalyzed glycerolysis. Response surface methodology (RSM) and five-level-five-factor central composite ratatable design (CCRD) were adopted to evaluate the effects of synthesis variables, such as reaction time (10-50 min), temperature (25-65 OC), substrate molar ratio (alcohol : acyl doner = 1:2-1:4), enzyme amount (20-100%) and enzyme pH value (5-9), on percentage molar conversion of 1,3-diacylglycerols. The results showed, monoacylglycerols were the main production at more polar organic solvent reaction system (2M2B and n-hexane), conversion reached to 65.00%. At non-polar organic solvent reaction system (n-hexane and octane), production was tend to synthesise of diacylglycerol. In glycerolysis reaction, when solvent composition of n-hexane : octane was 1:1, 40.00% of 1,3-diacylglycerol was synthesized, in interesterification, the solvent composition of n-hexane : octane was 1:1, 55.00% of 1,3-propylene glycol diester was synthesized. The optimum conditions of 1,3-propylene glycol diester synthesis were : reaction time 40 min, temperature 50 OC, substrate molar ratio 1.0:2.5 (alcohol : acyl doner), enzyme amount 80% and enzyme pH value at 6, and the highest yield was 47.03%.

Keywords : solvent engineering, diacylglycerols, mixture design, Response Surface Methodology

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