ABSTRACT

PRIMA LUNA. Optimization Lipase-Catalyzed Synthesis of Monolaurin in Circulated Packed Bed Reactor. Supervised by NURI ANDARWULAN and TRI HARYATI

Monolaurin is a special food grade monoglyceride, which has a function beside as emulsifier and food preservative, also has an ability to destroy Herpes and HIV-1 virus. It was reported that monolaurin had the greatest antimicrobial activity among monoglycerides. Novozyme® 435 catalyze the esterification of lauric acid and glycerol in organic solvent. The purpose of this research were: 1) to obtain optimum condition to synthesis monolaurin using Novozyme® 435; 2) to analyze the stability of Novozyme® 435 in continuous system. Continuous Esterification was employed in circulated packed bed reactor. This research was using Response Surface Methods (RSM) as experimental design and temperature and time reaction were as variables.

Continuous circulated packed bed reactor had residence time of 23.57 minute, glycerol/ oil molar ratio of 5:1, solvent/substrate ratio of 8.8:1, and the process produced MAG up to 80%. Optimization of synthesis MAG obtained quadratic equation which was $Y = -61.700 + 6.088x_1 + 3.259x_2 - 0.065x_1^2 + 0.017x_1x_2 - 1.792x_2^2$ with $R^2 = 0.5408$, optimum temperature and time reaction of 46.92°C and 1.1 hour, respectively. The product yield was 81.09% and contained MAG of 83.15%. The product had acid value of 1.78±0.08 %, peroxide value of 0.49 ± 0.14 meq O₂/kg MAG, free glycerol content of 0.26%, and melting point 53-53.5°C. The enzyme remain stable during 10 reaction cycles and up to 70% produced of MAG at each cycle.

Keywords: monolaurin, continuous esterification reaction, optimization, enzyme stability