

Songsri Santisawadi 2013: Synthesis of Diacylglycerol from Palm Oil Distillate. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Assistant Professor Utai Klinkesorn, Ph.D.  
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Palm oil distillate, a co-product of the palm oil refining process, obtains 4% of initial crude palm oil. It has approximately 80% of free fatty acid. Therefore, palm oil distillate can be used as substrate for synthesis of DAG in order to add value to a co-product. The objective of this study was to investigate the optimum condition for DAG synthesis by lipase-catalyzed esterification of glycerol with palm oil distillate using lipase from *Rhizomucor miehei*. The effect of independent variables including substrate molar ratio (0.75 to 2.25 mol), enzyme concentration (2.0 to 3.0 wt%) and the amount of molecular sieve (25 to 35 wt%) on the DAG yield were determined using a three factors central composite design (CCD). Significant regression models which explain the effect of different levels of independent variables on DAG yield and optimum conditions were determined. The coefficient of determination values ( $R^2 = 0.87$ ) for the model indicated that response surface analysis could be a proper methodology for optimizing the DAG synthesis. A lack of fit analysis revealed a non-significant value for the model equation, indicating that the regression equation was adequate for predicting the conversion of DAG. The optimum conditions obtained from the response surface analysis was 1.23 mol for the molar ratio between fatty acid and glycerol, 31.1 wt% molecular sieve and 2.32 wt% enzyme. Alkaline neutralization of the esterification products yielded neutralization residues containing approximately 70% DAG. The fatty acid compositions of DAG are palmitic acid 71.5%, oleic acid 23.3%, stearic acid 4.2%, myristic acid 0.9% and linolenic acid 0.4%.

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