

Production of tuna fish oil fractions as potential source of omega-3 fatty acids through alcoholysis catalyzed by commercial immobilized *Rhizomucor miehei* lipases

Produksi fraksi minyak ikan tuna kaya asam lemak omega-3 melalui reaksi alkoholisis enzimatis menggunakan lipase *Rhizomucor miehei*

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Abstract

Tuna fish oil is known as potential source of omega-3 fatty acids (EPA and DHA). In Indonesia, tuna oil as byproduct of tuna canning industry has not been optimally used. In this research tuna fish oil was processed through alcoholysis catalyzed by commercial immobilized *Rhizomucor miehei* lipases to produce fractions of glycerides (monoacylglycerol/MAG and diacylglycerol/DAG) and monoester of butyl ester (BE). Gas chromatography (GC) analysis of fatty acids content showed that omega-3 fatty acid was concentrated in mono and diacylglycerol fractions. Optimum condition of enzymatic alcoholysis reaction to produce MAG and DAG fraction rich in omega-3 fatty acids were: 6 hours incubation; 55 deg. C incubation temperature; 6 percent (w/w) enzyme concentration and substrate ratio (tuna fish oil:n-butanol) of 1:7.94 (mole/mole). At the optimum conditions, composition of reaction yield were 21.92 percent (w/w) MAG fraction, 39.09 percent (w/w) DAG fraction, 4.86 percent (w/w) TAG fraction and 34.13 percent (w/w) BE fraction (based on relative fraction area, analyzed by TLC scanner). EPA, DHA and total omega-3 fatty acids concentration of MAG fraction increased 3.59, 3.40 and 3.42 folds, respectively, and of DAG fraction increased 1.78, 2.50 and 2.36 folds, respectively, from the initial concentration. Potentially, glyceride fractions rich in omega-3 fatty acid produced may be considered as double functional ingredients both as emulsifiers and omega-3 fatty acid sources.