Synthesis of DHA Rich Glycerides with Immobilized Lipases from Mucor miehei and Rhizopus oryzae

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Abstract: The esterification of Docosahexaenoic acid (DHA) with glycerol using immobilized Mucor mie-hei lipase (MML) and Rhizopus oryzae lipase (ROL) have been studied in the present paper to synthesize triglycerides (TG) rich in DHA. Both immobilized lipases (MML and ROL), and their support materials (immobead-150 and ion-exchange resin) were characterized and compared for surface properties with BET, for chemical functional groups with FT-IR, and for particle size distribution with particle size analyzer. The most suitable reaction conditions for synthesis of DHA rich TG in biphasic solvent system were found as 1:3 (wt/wt) glycerol to DHA ratio, 1:1 (wt/wt) buffer to DHA ratio, 1:1 (wt/wt) solvent to DHA ratio at 50 °C temperature, and 600 rpm speed of agitation with 100 mg of immobilized lipases. Maximum 95.9 % esterification was obtained with immobilized MML in 14 days reaction with formation of 65.7 wt% DHA rich TG. Whereas, immobilized ROL has shown formation of only 23.8 wt% DHA rich TG with total 78.9 % esterification in 15 days. Additionally, repeated use of both immobilized lipases was con-ducted up to five cycles, indicated 50.4% and 41.2 % activity retention after fifth repeated use of immobilized MML and ROL, respectively.

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