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Lipase-Catalyzed Synthesis of Novel Nutraceutical Structured Lipids in Non-Conventional Media

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Abstract : A process for the synthesis of structured lipids (SLs) by the lipase-catalyzed interesterification of selected endogenous edible oils such as flaxseed oil (FO) and medium-chain triacylglyceols such as tricaprylin (TC) in non-conventional media (NCM), including organic solvent media (OSM) and solvent-free medium (SFM), was developed. The bioconversion yield of the medium-long-medium-type SLs (MLM-SLs were monitored as the responses with use of selected commercial lipases. In order to optimize the interesterification reaction and to establish a model system, a wide range of reaction parameters, including TC to FO molar ratio, reaction temperature, enzyme concentration, reaction time, agitation speed and initial water activity, were investigated to establish the a model system. The model system was monitored with the use of multiple response surface methodology (RSM) was used to obtain significant models for the responses and to optimize the interesterification reaction, on the basis of selected levels and variable fractional factorial design (FFD) with centre points. Based on the objective of each response, the appropriate level combination of the process parameters and the solutions that met the defined criteria were also provided by means of desirability function. The synthesized novel molecules were structurally characterized, using silver-ion reversed-phase high-performance liquid chromatography (RP-HPLC) atmospheric pressure chemical ionization-mass spectrophotometry (APCI-MS) analyses. The overall experimental findings confirmed the formation of dicaprylyl-linolenyl glycerol, dicaprylyl-oleyl glycerol and dicaprylyl-linoleyl glycerol resulted from the lipase-catalyzed interesterification of FO and TC.

Keywords : enzymatic interesterification, non-conventinal media, nutraceuticals, structured lipids
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