Crystalization Behavior of Structured Lipids Produced with Lard and Soybean Oil by Enzymatic Interesterification in a Continuous Packed-bed Reactor

Silva, R C[1], Fernandes, T G[1], Castells, A L D[1], Silva, K C G[1], Soares, F A S D M[1], Gioielli, L A[1]

[1] Department of Biochemical and Pharmaceutical Technology, Faculty of pharmaceutical Sciences, University of São Paulo, Av. Prof. Lineu Prestes n. 580, B16, CEP 05508-900, São Paulo, SP, Brasil

The use of lipases for the modification of fats and oils has many benefits when compared to chemical processes. Lipases are well known for their efficacy under mild reaction conditions (pH, T and P), leading to reduced costs and energy consumption. The use of lipases in a natural reaction system can also reduce environmental pollution by reducing production of side products, since these reactions mimick natural pathways. However, the most important property of lipases that has led to their overwhelming interest remains their specificity. This property has been shown to be a versatile tool for the preparation of a wide variety of novel TAGs. The main goal of the present research effort was to evaluate the crystalization behavior of mixtures of lard and soybean oil following enzymatic interesterification catalyzed by a lipase from *Thermomyces lanuginosa* (Lipozyme™ TL IM), for the production of a human milk fat substitute. Structured lipids was synthesized with pure lard and soybean oil and their three mixtures (80:20, 70:30, 60:40) through enzymatic interesterification in a continuous packed-bed reactor (leght: 34 cm, inner diameter: 2 cm) equipped with a peristaltic pump. Immobilized lipase (70g) enzyme was soaked with soybean oil for the removal of air and water in the enzyme. The column was surrounded with a heating double jacket. That was connect to a water bath for maintaining the reactor temperatures at 60 ºC. The mixtures was pumped into the reactor at volumetric flow rate of 1 mL/min. Crystallization kinetics and polarized light microscopy were used to analyze the mixtures before and after interesterification The addition of soybean oil changed the lard crystallization, by the effect of the dilution. Lipase catalyzed interesterification produced new triacylglycerols that changed the crystalization behavior of the fat mixtures under study. Cristalizated area of lard was increased after enzymatic interesterification and this behavior can be explained by the increase in the amounts of SSS and SSU triacilglicerols, which have higher melting points.