

Effect of Sorbitan Esters Composition on Crystallization of Refined Palm Oil

Ming, C. C.¹; Santos, C. A.¹; Gonçalves, L. A. G.¹.

¹Fats and Oils Laboratory, Faculty of Food Engineering, University of Campinas – UNICAMP, Campinas, SP, Brazil. camilia.ads@gmail.com

Refined palm oil (RPO) has been for several years the major traded oil in the world. It is naturally free of trans fatty acid, although it presents a slow crystallization. Additives might be added to RPO as an attempt to change its crystallization behaviour adapting it to industrial processes. Among these additives there are the sorbitan monolaurates (SMLa), monopalmitates (SMP), monostearates (SMS) and monooleates (SMO). In this study we investigated if the chain length of the esterified fatty acid or its unsaturation influenced on crystallization behaviour of RPO and if differences in the SMS composition could be related to differences found in crystallization behaviour of RPO after its addition. Samples containing only RPO and samples with 0.5% (w/w) of each additive were analyzed by isothermal crystallization at 25°C by Nuclear Magnetic Resonance (NMR). The RPO sample presented an induction time (τ_{SFC}) of 35 minutes and emulsifier added samples presented τ_{SFC} from 38 to 100 minutes, retarding the nucleation event. The two longer τ_{SFC} were found for the samples with SMLa (100 minutes) and SMO (61 minutes) added. Differential Scanning Calorimetry (DSC) analysis were carried out for the all pure emulsifiers samples from the study and the results indicated that SMLa and SMO, which have the shortest chain and unsaturated fatty acids respectively, presented the lowest crystallization temperatures (T_{onset} and T_p). These temperatures were much lower than crystallization temperatures of high temperature melting peaks from RPO, that could explain their effects on retarding more efficiently the nucleation event and the crystallization rate, observed by the lower solid fat content reached on isothermal crystallization. RPO samples with 0,5% (w/w) SMS from 3 different suppliers (C, D e E) showed opposite crystallization behaviors suggesting differences on their composition, possibly related to the amount of mono-, di- and triesters of fatty acids, leading to distinct interactions with triacylglycerols of RPO.