

Influence of Modified Lecithins on Crystallization Behavior of Cocoa Butter

MIYASAKI, E.K., MING, C.C., LUCCAS, V., KIECKBUSCH, T.G.

School of Chemical Engineering – FEQ, University of Campinas – B r a z i l
Campinas-SP, Brazil

Cocoa butter (CB) is composed by a mixture of well-defined triacylglycerols (TAG) conferring specific physicochemical properties to chocolates. To enhance workability during chocolate production, the formulation contains a small amount of emulsifiers, usually limited to soy lecithin and PGPR. Emulsifiers with different HLB properties may affect the crystallization process, the polymorphic transition and melting properties of fats. The purpose of modifications of conventional emulsifiers like lecithins is to improve the physicochemical and emulsifying properties and also the dispersibility. This work aimed to investigate the influence of modified soy lecithins (acetylated, hydroxylated, enzymatically hydrolyzed and de-oiled) on the crystallization process of Cocoa Butter, at different concentrations (0.2, 0.5% and 0.8% (w/w)). The results were compared with data obtained using standard lecithin. The major TAG components of the cocoa butter sample were POP (19.89%), SOS (39.74%) and POS (21.60%) and the amount of trisaturated, monounsaturated, di- and tri-unsaturated were 1.55%, 87.70%, 9.99% and 0.76% respectively. In all samples tested, the values of Solid Fat Content were approximately 76% (10°C), 70% (15°C), 63% (20°C), 53% (25°C), 27% (30°C), 0.5% (35°C), and 0.3% (40°C). The Avrami's n parameter obtained from isothermal crystallization data at 15°C were close to 2, suggesting uniformity in the types of crystals formed and the growth mechanisms. Among the emulsifiers tested, the enzymatically hydrolyzed lecithin was the most effective in accelerating the rate of crystallization, followed by the standard, hydroxylated, de-oiled, and acetylated lecithin, in that order. The values of the Avrami's parameters n and k of the samples with emulsifier concentration of 0.2 % were: 2.10 and 2.80E-04; 2.16 and 2.12E-04; 2.16 and 2.12E-04; 2.15 and 2.13 E-04; 2.28 and 1.29 E-04, respectively. Pure cocoa butter presented n and k values of 2.34 and 8.42E-05. The crystallization enthalpy values ranged from 80 to 90 J/g without a definite trend. Based on these results, the enzymatically hydrolyzed lecithin has a great potential to be used in chocolate production and in other confectionery applications.