

Influence of the Triacylglycerol Saturated Fatty Acids Asymmetric Distribution on the Physical Properties of Oils.

Miguel A. Bootello, Joaquín J Salas, Enrique Martínez-Force and Rafael Garcés
Instituto de la Grasa, Consejo Superior de Investigaciones Científicas (CSIC),
Avenida Padre García Tejero, 4, 41012, Sevilla, Spain.

Triacylglycerols, which are the main components of oils, are made up of three fatty acid molecules esterified to a glycerol backbone. Both the fatty acid composition and triacylglycerols species determine the physical, chemical, and nutritional properties of oils.

One of the main properties of vegetable oils is that they have low saturated fatty acid content in the *sn*-2 triacylglycerol position, even in oils with high saturated fatty acid content such as cocoa butter and high-stearic sunflower oils. Furthermore, recent studies indicated that saturated fatty acids are not randomly distributed in the *sn*-1 and *sn*-3 triacylglycerol positions in most vegetable oils, as originally reported. In this regard, a coefficient has been proposed to calculate the asymmetry of saturated fatty acids between the external triacylglycerol positions, which was denominated the alpha coefficient.

The aim of this work was to evaluate the influence of the triacylglycerol saturated fatty acid asymmetry distribution on physical properties of oils, using high-stearic and high-oleic sunflower oils as model. We have selected sunflower oils with an alpha coefficient ranging from 0.10 to 0.50, high to no asymmetry respectively. When alpha is 0.5 there is a symmetrical distribution of saturated fatty acids in accordance with the Van der Wal theory. Triacylglycerols were analysed, determining their molecular species and fatty acid methyl esters compositions and the alpha coefficient values calculated. Differential scanning calorimetry (DSC) analysis of samples was made to show the variation on its physical properties, in particular the modification of solid fat content percentage with temperature.