

# **Study and Modeling of Physical Properties of Fat Blends**

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The properties of the fats and oils selected for a particular application are of major importance in the design of a product for a specific or general function. Formulation of margarines, shortenings and other fat-based products is based primarily on an understanding of the relationships between specific values of physical characteristics and the composition of the fat blends and their components along with an appreciation of processing effects. Desirable solids-to-liquid ratios are achieved by blending and processing. The fat crystal networks are determinant factors in formulating margarines, shortenings and other fat-based products, because each crystal structure is characterized by its own physical properties for texture, plasticization, mouth feel, spreadability, hardness, solubility and other properties, always depending on their final use. Each fat and oil has an inherent peculiar crystal tendency which can be modified with various processes so as to obtain the desired properties, such as hydrogenation or interesterification.

In this work, fats (palm oil, palm stearine, hydrogenated cottonseed oil) and liquid oils (sunflower oil, cottonseed oil, corn oil) were blended in various ratios by forming binary and ternary mixtures with a different base fat or oil each time without containing emulsifiers. The solid fat content of fat mixtures was determined by direct low resolution pulse nuclear magnetic resonance (NMR) in different temperatures, while their melting point, rheological parameters and hardness index measured by penetration technique. The variety of results indicated the crystalline structures and behavior of the fat mixtures and provided information for their texture attributes. In addition, the measurements constituted the foundations of the construction of models, which correlated the solid fat content with melting point, hardness and rheological constant and may be helpful for predicting the crystal behavior of fat mixtures with similar physical characteristics. Those mixtures were used as final purpose in the production of bread from white flour, which was determined by its textural and sensory quality.