KINETIC STUDY OF PALM OIL AND SOYA BEAN OIL MIXTURES

by

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Abstract

Palm oil consists mainly of triacylglycerols of palmitic and oleic acids. It is a semi-solid at room temperature and can be separated into two fractions, i.e. a solid fraction (stearin) and a liquid fraction (olein) by fractionation process at a controlled temperature. The stearin fraction is a co-product of olein production and is a cheaper fraction. However, with the slip melting point in the range of 46-50°C, and it is a highly saturated fat, only 10% is used as a very useful source of natural hard component in the manufacture of edible fat such as margarine, shortenings, vanaspati etc.

Considerable potential in the usage of palm stearin in the edible food industry exists if the physical and chemical properties of palm stearin can be modified. In this study the palm oil, soft and hard stearins were blended with 100% pure highly unsaturated soya bean oil at different ratios. The slip melting point (SMP), iodine value (IV), solid fat content (%SFC) by Pulsed Nuclear Magnetic Resonance, and fatty acids composition by Gas Chromatography of the blends were determined. These data then used for the crystallization study based on the thermal behaviour by Differential Scanning Calorimeter, crystal morphological by using polarized microscope and crystal polymorphic forms by X-ray diffractometer.

The three basic polymorphic forms α, β and β' exhibit distinct properties being largely dependent on the crystallization conditions. With the understanding of the behaviours of these blends, it hoped that the usage of palm oil, especially the stearins could be increased and diversified.

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TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

Palm oil is derived from the mesocarp of fruit of oil palm *species Elaeis guineasis*. Crude palm oil is a semi-solid at room temperature. Palm oil has characteristics that make it a versatile ingredient in food products. By simple fractionation, palm oil can be resolved into liquid, a solid and an intermediate fractionated palm olein (palm-mid fraction) and various grades of palm stearin can be obtained (Loke et al., 1989). The simple flow diagram of palm oil fractionation process was shown in Figure 2.1.

Palm stearin is a solid fraction and a co-product of palm olein production (the average stearin / olein being about 25/75). The physical characteristics of stearin differ significantly from those of palm oil and it is available in a wide range of melting points and iodine values. With a slip melting point (SMP) range between 46 and 56°C, palm stearin is a very useful source of fully natural hard fat component for products such as shortenings, pastry margarines, etc. At room temperature (≈ 25°C), palm stern behaves as a solid and lacks the spreadibility needed in products like margarine and shortening. Also may not be able to impart the required plasticity and body to the end products. Considerable potential in the usage of palm stearin in the edible food industry exists if the physical and chemical properties of palm stearin can be modified. The advent of the more common processes such as hydrogenation (Grothues, 1988; Kheiri, 1984), interesterification (Bhattacharyya et al., 1992); and simple blending (Young, 1985) for the modification of fatty acid and triglyceride