

UNIVERSITI TEKNOLOGI MARA

**OPTIMISATION OF PALM STEARIN,
PALM KERNEL OIL AND SOYBEAN
OIL BLENDS FOR MARGARINE
FORMULATIONS**

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of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.


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ABSTRACT

Palm stearin has limited application in natural form because of its high melting point, low plasticity and hence cannot be used directly in margarine production. Palm kernel oil contains short and medium triacylglycerols that can give desired melting characteristics and ensures the stable beta prime (β') polymorph in products. To enhance the PS compatibility, it needs to be blended and/or interesterified with soybean oil to impart desirable properties to the final products. Blends of PS, PKO and SBO at certain proportions were formulated using a mixture design (Design Expert 8.0.4, 2010). All the 10 oil blends were subjected to chemical and enzymatic interesterification. The physicochemical, thermal, polymorphism, microstructural, textural properties and kinetics of isothermal crystallisation were studied. The interesterified (IE) blends had lower slip melting points and solid fat contents due to the randomisation in the TAGs. Interesterification also promotes significant alterations in the microstructural and polymorphism of blends, resulted in smaller crystals with β' form. The hardness of interesterified blends were reduced following the reaction. Interesterification also altered the mechanism of crystallisation kinetics of the blends, depending on the composition and the crystallisation temperatures. The optimisation of interesterified ternary blends for *trans*-free table (TM) and soft margarine (SM) formulations were conducted through graphical multiple responses in Design-Expert. The CIE and EIE for the TM formulation showed slightly different proportions of PS/PKO/SBO with 50/18/32 and 50/22/28 (w/w), while for SM formulation, both the interesterified blends give the same proportions of 51/0/49 (w/w) of PS/PKO/SBO.

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