

MARGARINE STRUCTURED BY PALM OIL-BASED STRUCTURAL FAT SUITABLE FOR REFRIGERATED AND NON-REFRIGERATED RETAIL TABLE MARGARINE SEGMENT

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Refrigerated and non-refrigerated margarines are two categories of retail spread margarines marketed in Malaysia. Refrigerated and non-refrigerated margarines are applicable at different temperature ranges. Refrigerated margarine is applicable from 5°C-25°C and non-refrigerated margarine is applicable from 25°C-35°C. The key characteristic of refrigerated margarine is that it should be spreadable directly from the refrigerator (5°C) and should not oil out at usage temperature of 20°C-25°C. Non-refrigerated margarine on the other hand, has a higher slip melting point than refrigerated margarine as this category of margarine is stored and used in the temperature range of 25°C-35°C. Generally, non-refrigerated margarine turns hard (in some cases becomes brittle and cracks) when store at temperatures lower than 10°C. Hence, these two types of margarine require two different types of oil blend to cater for different application temperatures.

MPOB 01 margarine was formulated with palm oil-based structural fat to produce a margarine that is applicable in both the refrigerated and non-refrigerated margarine segment, crossing the boundaries of products which are significantly different in their physical and chemical characteristics.



TECHNOLOGY

MPOB 01 margarine structured by palm-based structural fat was applicable and stable in the temperature range of refrigerated and non-refrigerated margarine. Hence, reducing the need to have two different formulations with significantly different physical and chemical characteristics. *Figure 1* shows the solid fat content of MPOB 01 margarine, the upper and lower limits of commercial refrigerated and non-refrigerated margarine. The solid fat content shows that the MPOB 01 margarine is suitable to be use between the ranges of 5°C-35°C.

The stability and spreadability of the fat blends depend on the formulation and the processing. Instantaneous crystallisation was applied in

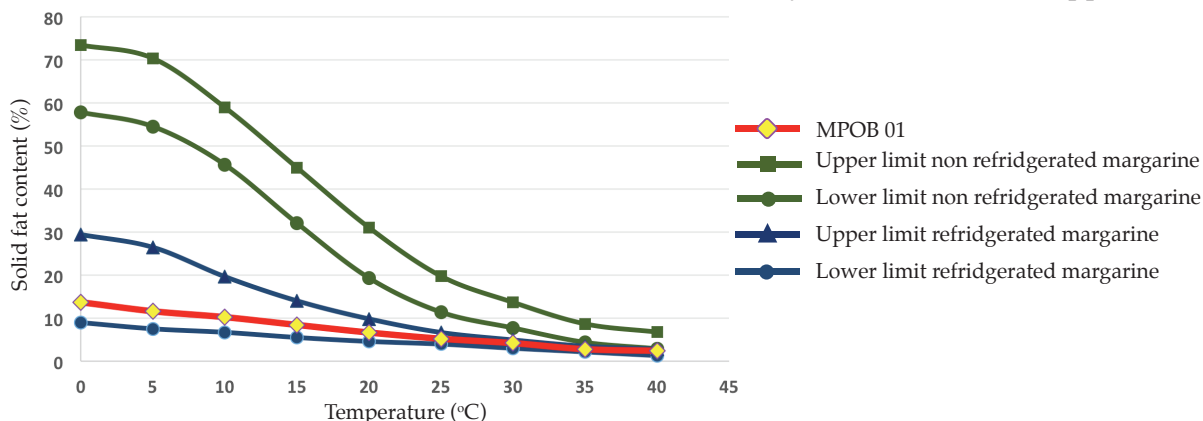


Figure 1. Solid fat content of MPOB 01 margarine, upper and lower level of retail refrigerated (RRM) and non-refrigerated margarines (RNRM).

the processing of MPOB 01 margarine as this technique is currently the most effective method to maximise the entrapment of liquid oil within the crystal structure and crystal network (Heertje, 1993). MPOB 01 was texturised through a perfector pilot plant to obtain firm solid like characteristics of margarine. The effective entrapment of liquid within the crystal structure and crystal network enables the fat blend to exist as continuous and homogenous solid phase, which enables ease of spreading. The ability to portray the firm solid like behaviour is the key to a successful fat blend. The solid liquid balance plays a very vital role in maintaining the firm texture. This solid liquid balance is influenced by temperature, the amount of solids present, the inter-solubility of the triacylglycerols, the interaction of crystal structure and the crystal network.

The structural stability of MPOB 01 margarine at 35°C was determined by Stability Analyser LUMifuge's, which applies centrifugal force with an in-built near infrared (NIR) detector to measure the amount of free oil released from the fat. *Figure 2* is the representation of graphical transmission profile of the MPOB 01 margarine, where zones of concentrated fat will scatter and absorb light, thereby lowering transmission. In contrast, clear liquid will raise the transmission levels (Mende *et al.*, 2007, Klein *et al.*, 2010, Sivaruby *et al.*, 2013). The transmission profile of the margarine MPOB 01 shows a stable solid structure, which denotes that this margarine's structure is stable at 35°C, without any indication of oil release.

MPOB 01 margarine blend was neither hydrogenated nor interesterified to achieve the

required functionality. The effective oil entrapment ability of palm oil-based structural fat enabled the robust formation of oil crystal matrix, which contributed to the firmness and consistent texture of this margarine product to retain its structure from the temperature of 5°C-25°C.

NOVELTY

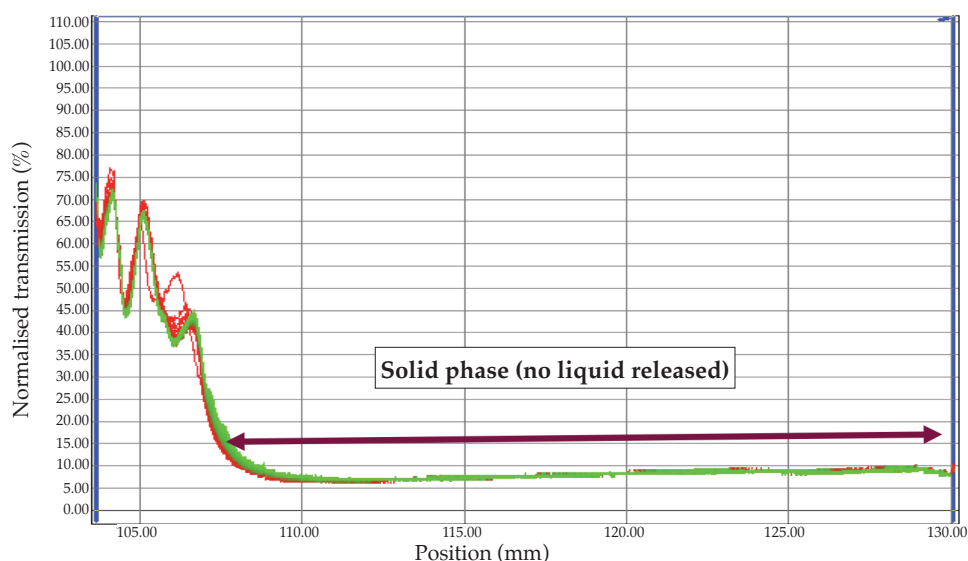
MPOB 01 margarine is applicable in a very wide range of temperate from 5°C-35°C. Eliminating the requirement to have two dedicated formulations for refrigerated margarine, which is applicable from 5°C-25°C and non-refrigerated margarine which is applicable from 25°C-35°C.

BENEFITS

- MPOB 1 margarine is 100% plant based;
- A robust margarine product that covers both refrigerated and non-refrigerated segment, which does not harden at 5°C and melts at temperatures above 35°C;
- Cost effective formulation; and
- Does not require refrigeration, hence reducing the cost of transportation and storage.

TARGET MARKET

Manufacturers of commercial retail margarine, who are producers of refrigerated and non-refrigerated margarines. MPOB 01 margarine will eliminate the requirement of two dedicated formulations for refrigerated margarine and non-refrigerated margarine.



Note: Transmission is absent in zones with solid fat as the light is scattered and absorbed. Zones with liquid oil allows light through, thereby elevating the transmission levels.

Figure 2. Near infrared transmission profiles of MPOB 01 at 35°C by Stability Analyser LUMifuge.

ECONOMIC EVALUATION

This product should be taken up by existing margarine manufacturers as an additional value-added product. The production of this margarine neither requires additional equipments nor facilities. A basic margarine plant with tempering room of 25°C will be the main requirement. This margarine should be positioned and marketed in the premium sector of the retail margarine segment. The cost of the MPOB 01 margarine oil blend is RM5.00 per kg.

CONCLUSION

MPOB 01 margarine structured by palm oil-based structural fat is suitable for refrigerated and non-refrigerated margarine segment. The applicable temperature range of this margarine is 5°C-35°C. The palm oil-based structural fat is able to assemble crystal matrix that can retain the firmness and structure required by the margarine product at temperatures between 5°C and 35°C.

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