



**UNIVERSITI PUTRA MALAYSIA**

**FORMULATION AND STORAGE PROPERTIES OF TRASPARENT  
SOAP PREPARED FROM ENZYMATICALLY AND NON-  
ENZYMATICALLY TREATED PALM-BASED MATERIALS**

**KOH SOO PENG.**

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TREATED PALM-BASED MATERIALS**

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**MASTER OF SCIENCE  
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**By**

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PREPARED FROM ENZYMATICALLY AND NON-ENZYMATICALLY  
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**March 2004**

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**Faculty: Food Science and Biotechnology**

The study on the physical and chemical properties of 28 samples of commercial transparent soap provided valuable information that could be used as a guideline in the preparation of palm-based transparent soap formulation. Most of the commercial transparent soaps had good transparency (above 0.8) with a moderate total fatty matter of between 40% and 60%. They were mostly superfatted products and showed good foamability and hardness with a penetration value of less than 5 mm.

Differences in titer, acid and iodine values affected the ability of different palm-based fatty acid in accepting the amount of sodium salt into soap formulation and the hardness property. The proper combination of triethanolamine, glycerol and sugar solution played an important role in determining the transparency, hardness, foamability and moisture content of the soap produced. Transparent soap bar made from blends of distilled palm stearin fatty acid with ricinoleic acid covered a wide range of acceptability for triethanolamine (20-90%) with low amount of sugar



solution (less than 30%) and less than 70% of glycerol. However, in blends of distilled palm oil fatty acid-based soap with ricinoleic acid, the transparent soap region ranged between 40% and 80% triethanolamine, less than 40% of glycerol and between 20% to 50% of sugar solution. Both blends of distilled palm fatty acid-based transparent soap had transparency reading above 0.8 and penetration value of less than 8 mm with the majority of moisture content of soap falling between 15% and 20%. In the region of low percentage of triethanolamine (0%-20%) with 80-100% of glycerol and sugar solution used, both distilled palm fatty acids used in soap formulation produced soft and gummy opaque soap.

Lipase-catalysed acidolysis is a vital tool to tailor-make refined, bleached and deodorised palm oil (RBD palm oil) enriched with ricinoleic acid (RA). Lipozyme IM60 lipase performed better (12.33% RA/24 hours) than *Pseudomonas* sp. lipase (2.59% RA/24 hours) as it was able to incorporate more ricinoleic acid into RBD palm oil at a shorter time. The alteration in triglyceride composition of acidolysed oil had led to the changes in their slip melting point, iodine value, solid fat content, crystallisation and melting behaviour and also the viscosity of the acidolysed oil produced.

The differences in sodium salt content used in different fatty raw material-based soap formulation had caused an effect on the transparency, total fatty matter, penetration value, chloride content and foamability of soap made. In general, the presence of ricinoleic acid in the blends of distilled palm oil fatty acid soap, blends of distilled palm stearin fatty acid soap and acidolysed oil-based soap assisted in improving the

soap transparency, especially when high contents of sodium salt were used in the soap formulation.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

**FORMULASI DAN CIRI-CIRI PENYIMPANAN SABUN LUTSINAR  
DIHASILKAN SECARA BERENZIM DAN BUKAN BERENZIM BAHAN  
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Kajian terhadap ciri-ciri fiziko dan kimia bagi 28 sampel sabun lutsinar komersial membekalkan maklumat berguna dalam penyediaan formulasi sabun lutsinar berasaskan minyak sawit. Kebanyakan sabun lutsinar komersial mempunyai tahap lutsinar melebihi 0.8 dengan kandungan asid lemak yang sederhana di antara 40-60%. Kebanyakan sabun lutinar di pasaran adalah produk 'superfatted' dan mempunyai kebulihan yang baik dan kekerasan dengan nilai penembusan kurang daripada daripada 5 mm.

Perbezaan dalam nilai titer, nilai asid dan nilai iodin mempengaruhi keupayaan asid lemak berasaskan minyak sawit yang berlainan terhadap penerimaan kuantiti garam natrium dalam formulasi sabun dan ciri kekerasan. Kombinasi yang bersesuaian di antara triethanolamine, gliserol dan larutan gula memainkan peranan penting dalam penentuan kelutsinaran, kekerasan, kebulihan dan kandungan kelembapan sabun yang dihasilkan. Ketulan sabun lutsinar diperbuat daripada campuran hasil sulingan asid

lemak minyak stearin boleh menerima 20-90% triethanolamine, larutan gula kurang daripada 30% dan gliserol kurang daripada 70%. Manakala, bagi sabun lutsinar yang diperbuat daripada campuran hasil sulingan asid lemak minyak sawit, 40-80% triethanolamine dengan gliserol kurang daripada 40% dan larutan gula di antara 20% hingga 50% adalah diterima dalam formulasi sabun. Kedua-dua jenis sabun lutsinar yang diperbuat daripada campuran hasil sulingan asid lemak berlainan mempunyai tahap kelutsinaran melebihi 0.8 dan nilai penembusan kurang daripada 8 mm serta kandungan kelembapan antara 15% dan 20%. Dalam lingkungan 0-20% triethanolamine dan keseluruhan julat peratusan bagi gliserol dan larutan gula dalam formulasi sabun, kedua-dua jenis hasil sulingan asid lemak minyak sawit menghasilkan sabun lutcahaya yang lembut dan berperekat.

Asidolisis menggunakan lipase merupakan teknik penting dalam pembuatan RBD minyak sawit yang kaya dengan asid ricinoleic (RA). Lipase Lipozyme IM60 mempunyai prestasi yang lebih baik (12.33% RA/24 jam) berbanding lipase *Pseudomonas* sp. (2.59% RA/24 jam) kerana ia berupaya memasukkan asid ricinoleik dalam RBD minyak sawit dalam masa yang lebih singkat. Perubahan dalam komposisi trigliserida menyebabkan perubahan dalam takat lebur slip, nilai iodin, kandungan lemak pepejal, kelakuan pembekuan dan peleburan serta viskositi bagi minyak sawit yang telah diubahsuai melalui asidolisis.

Perbezaan dalam kandungan garam natrium bagi bahan mentah yang berlainan dalam formulasi sabun mempunyai kesan terhadap kelutsinaran, kandungan asid lemak, nilai penembusan, kandungan klorin dan kebuihan sabun lutsinar yang dihasilkan. Secara amnya, kehadiran asid ricinoleik dalam sabun lutsinar yang diperbuat



daripada campuran hasil sulingan asid lemak minyak sawit, campuran hasil sulingan asid lemak minyak stearin dan minyak sawit yang telah diasidolisis mampu memperbaiki kelutsinaran sabun, terutamanya bagi kandungan garam natrium yang tinggi dalam formulasi sabun.

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I certify that an Examination Committee met on 18<sup>th</sup> March 2004 to conduct the final examination of Koh Soo Peng on her Master of Science thesis entitled “Formulation and Storage Properties of Transparent Soap Prepared from Enzymatically and Non-Enzymatically Treated Palm-Based Materials” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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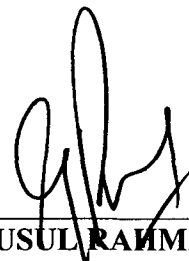
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## **DECLARATION**

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at University Putra Malaysia or other institutions.

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Date: 10 JUN 2004

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