
**UNIVERSITI PUTRA MALAYSIA**

***DEVELOPMENT OF ENGKABANG FATS LIPSTICK WITH PROTECTIVE PROPERTIES***

**NORAZLIN BINTI MAT HUSIN**

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# DEVELOPMENT OF ENGKABANG FATS LIPSTICK WITH PROTECTIVE PROPERTIES

**By**

**NORAZLIN BINTI MAT HUSIN**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science**

**September 2015**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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By

**NORAZLIN BINTI MAT HUSIN**

**September 2015**

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Development of halal lipstick cosmetics is gaining consumer attention with the growing of halal product industry worldwide. Protection properties such as moisturizing, antioxidant, sunscreen and microbial protection are required to prevent and improve lips condition whereas the used colour from the lipstick products beautify the lips. The purpose of this research is to prepare optimum lipstick formulation with protection properties containing engkabang fats and various ingredients from halal sources. The effect of engkabang fats as new solid ingredient and moisturizing component in lipstick formulation was studied. Preparation of engkabang fats lipstick formulation was carried out by mixing the melted waxes, oils, colorants and protection properties homogeneously, before being moulded into lipstick mould and cooled at -18°C to -20°C. The physico-chemical characterization of lipstick such as texture analysis, melting point, pH, colour intensity, stability studies, antioxidant scavenging assay, UV screening and moisture content of the formulation were determined. The safety evaluation of lipsticks was carried out by antimicrobial diffusion and skin irritancy assay. Lipstick formulations containing engkabang fats gave better results on texture analysis, melting point and moisture content value as compared to lipstick formulations without engkabang fats. Engkabang fats lipstick with additives formulations containing protection properties showed efficacy value similar to commercial lipsticks in the market which was used as reference samples.

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

**PEMBANGUNAN GINCU LEMAK ENGKABANG DENGAN SIFAT PERLINDUNGAN**

Oleh

**NORAZLIN BINTI MAT HUSIN**

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Pembangunan kosmetik gincu halal semakin mendapat perhatian pengguna seiring dengan perkembangan industri produk halal di seluruh dunia. Bahan-bahan penjagaan seperti pelembap, antioksidan, pelindung matahari dan perlindung mikrob dikehendaki untuk mencegah dan memperbaiki keadaan bibir dengan menggunakan produk gincu kosmetik disamping untuk mencantikkan bibir. Tujuan kajian ini adalah untuk menyediakan formula gincu yang optimum dengan ciri-ciri perlindungan yang mengandungi lemak Engkabang dan pelbagai bahan dari sumber yang halal. Kesan lemak Engkabang sebagai bahan pepejal dan komponen pelembab yang baru dalam penggubalan gincu telah dikaji. Penyediaan formulasi lemak Engkabang gincu telah dijalankan dengan mencampurkan dengan sebati lilin cair, minyak, pewarna dan bahan-bahan perlindungan, sebelum dibentuk menjadi acuan gincu dan disejukkan pada -18 °C hingga -20 °C. Pencirian fiziko-kimia produk gincu dari segi analisis tekstur, takat lebur, pH, keamatan warna, kelembapan, kajian kestabilan, antioksidan dan penabiran UV telah dijalankan. Penilaian keselamatan gincu telah dijalankan oleh ujian antimikrob dan kerengsaan kulit. Keputusan formulasi gincu yang mengandungi lemak Engkabang memberikan analisis tekstur, takat lebur dan nilai kandungan lembapan yang lebih baik berbanding gincu rumusan tanpa lemak Engkabang. Formulasi gincu lemak engkabang dengan bahan tambah mempunyai ciri-ciri perlindungan menunjukkan nilai keberkesanan yang sama dengan gincu komersil di pasaran yang digunakan sebagai sampel rujukan.

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I certify that a Thesis Examination Committee has met on 17 September 2015 to conduct the final examination of Norazlin binti Mat Husin on her thesis entitled "Development of Engkabang Fats Lipstick with Protective Properties" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| °C | Degree Celsius |
| °C/min | Degree Celsius per Minute |
| µg/disc | Micro per Disc |
| µL | Microliter |
| ACD | ASEAN Cosmetic Directory |
| ASEAN | Association of Southeast Asian Nations |
| $B_B$ | Beeswax (control) |
| BHA | Butylated Hydroxyanisole |
| BHT | Butylated Hydroxytoluene |
| BP | Butylparaben |
| CAGR | Cumulative Average Growth Rate |
| $C_B$ | Carnauba wax (control) |
| CFU $mL^{-1}$ | Colony Forming Unit |
| CJ | Engkabang fats in castor and jojoba oil |
| $CJ_B$ | Engkabang fats in castor oil and jojoba oil (control) |
| Cm | Centimetre |
| $Cn_B$ | Candelilla wax (control) |
| CO | Engkabang fats in castor and olive oil |
| COA | Engkabang fats in castor oil and oleyl alcohol |
| $COA_B$ | Engkabang fats in castor oil and oleyl alcohol (control) |
| $CO_B$ | Engkabang fats in castor oil and olive oil (control) |
| DPPH | 1, 1- diphenyl-2-dipicrylhydrazyl |
| EB | Engkabang fats+Beeswax |
| $EB_B$ | Engkabang Fats + Beeswax |
| EC | Engkabang fats+Carnauba wax |
| $EC_B$ | Engkabang fats+Carnauba wax |
| ECn | Engkabang fats+Candelilla wax |
| $ECn_B$ | Engkabang fats+Candelilla wax |
| EDTA | Ethylenediaminetetraacetic acid |
| EM | Engkabang fats+Microcrystalline wax |
| $EM_B$ | Engkabangfats+Microcrystalline wax |
| EP | Ethylparaben |
| FD&C Act | Federal Food, Drug & Cosmetic Action |
| $Fe_2O_3$ | Iron Oxide |
| g | Gram |
| g/mm | Gram per millimetre |
| GMO | Genetically Modified Organism |
| h | Hour |
| H | Hydrogen |
| HIE | Human Irritancy Equivalent |
| IIAS | International Irritection Assay System |
| IP | iso-butylparaben |
| $M_B$ | Microcrystalline wax (control). |
| min | Minute |
| mL | Millilitre |
| mm | Millimetre |
| MP | Methyl Paraben |



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| | |
|---|---|
| MRSA | *Methicillin Resistant Staphylococcus Aureus* |
| MS | Malaysian Standard |
| NA | Nutrient Agar |
| nm | Nanometre |
| NPCB | National Pharmaceutical Control Bureau |
| $OD_{450}$ | optical density |
| PABA | Para-amino Benzoic Acid |
| POEs | Palm Oil Esters |
| PP | Propylparaben |
| RM IM | Rhizomucor Miehei |
| SD | Standard Deviation |
| $TiO_2$ | Titanium Dioxide |
| USA | United State of America |
| UV | Ultraviolet |
| UVA | Ultraviolet (400-315 nm) |
| UVB | Ultraviolet (315-290 nm) |
| UVC | Ultraviolet (<290 nm) |
| ZnO | Zinc Oxide |

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# CHAPTER 1

# INTRODUCTION

## 1.1 Background of Study

An increasing attention to the technologically advanced cosmetic products, which are pleasant to look at, convenient to use and permissible to certain group including compliance to achieve the requirement of religion, led this study towards the realization of lipstick with protection properties from permissible and safe sources. Lipsticks are cosmetic formulations which are prepared by moulding a dispersion of colours in a waxy base, in the form of stick or crayon. Good lipstick characteristics have to cover lips adequately, long lasting effect, moisturising and non-irritating to lips skin. Lipstick should have good degree of quality, free from sweating, shiny and smooth in appearance as well as rich with vitamins (Joseph Lin, 2010). The difference in the characteristics of lipsticks available in the market depends on the additives used in the formulation. Generally, lipsticks are made of an oily vehicle comprising fats or oil which would make the products stiffened to a desired consistency. Addition of various waxes would enhance the physical properties of the lipsticks. Colour provided by the insoluble inorganic pigments are finely dispersed in the oily vehicle.

Cosmetic industry is always searching for new compound from plant which is beneficial to human skin and lips skin. Engkabang fats are introduced to replace conventional moisturizer like water, coco butter and shea butter in lipstick formulation. Engkabang fats also known as exotic butter has been reported to resemble cocoa butter. It is suitable for cosmetic application as it could provide soothing, moisturizing and protective element to the skin (Gani *et al*., 2009). The combination of α-tocopherol and ascorbyl palmitate as additives would enhance the ability of antioxidants which is responsible to counteract oxidization process. UV screens such as titanium dioxide and zinc oxide are important in lipstick formulation to prevent aging and sunburn on lips. Although there are many of lip products such as conventional lipstick and lip balm available in market like, not many provide the fore mentioned properties. No work was reported on the use of engkabang fats in lipstick formulations before.

Innovation of halal cosmetic product especially lipstick with protection properties from permissible ingredients will increase the market value as well as the halal cosmetic products industry, which showed cumulative average growth rate (CAGR) of 13.43% over the period of 2013-2018 (Halal Research Council, 2014). The market of lipstick product is not limited to only halal requirement but also for consumers looking for natural, organic with quality as well as safe products. This initiative is to merge halal sector comprising of halal cosmetic products industry which will entrench Malaysia's position in the global halal industry. Halal lipstick cosmetic products are suitable for Muslim and non-Muslim customers due to the wholesomeness (*tayyiban*) concept of halal, which covers not only the shariah requirement but also the safety, sustainability and environment aspect.



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## 1.2 Problem Statement

The need to look for cosmetics products with good properties and halal is a challenge as cosmetic industry growing bigger with different expectation from consumers. Ingredients, preparation, quality and safety of the lipstick product produced must meet the Syara' compliance. The focus to produce halal product must be ascertain only from the halal ingredients. Lipstick formulation has to find the optimization of mixture composition and stability aimed to obtain a product with the required characteristics by varying the ratio of ingredients. Engkabang fats was chosen as new solid ingredients due to the physico-chemical resembled cocoa butter which is well known for moisturizing skin. Introducing engkabang fats as solid ingredient in lipstick formulation and investigating the optimum ratio and effect in lipstick formulation is also a challenge. Ingredients such as beeswax, candelilla wax, carnauba wax, microcrystalline wax, castor oil, olive oil, palm oil ester, oleyl alcohol, jojoba oil and red $Fe_2O_3$ are common used in lipstick formulation. The addition of protection ingredients like antioxidant (α-tocopherol and ascorbyl palmitate), sunscreen ($TiO_2$ and ZnO) and preservative (Phenonip®) in the lipstick formulation can improve lipstick applications; however, the optimization is a tough challenge. The quality of lipstick formulation is directly linked to the material used in the formulation while safety is assurance for the costumer. All these aspects are challenges to be overcome to produce effective and halal cosmetic products.

## 1.3 Objectives of the Study

The main objective of this work is to prepare halal and *tayyiban* lipstick with protection properties such as moisturizing, antioxidant, sunscreen and antimicrobial capability. The specific objectives are as follows:

1) To prepare an optimum mixture compositions in engkabang fats lipstick preparation.

2) To characterize the physico-chemicals such as texture profile, melting point, pH, colour intensity, moisture loss content, antioxidant scavenging activity and UV screen activity of the engkabang fats lipstick formulations.

3) To evaluate stability and safety which are irritation and microbial growth of engkabang fats lipstick with additives.

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