

UNIVERSITI TEKNOLOGI MARA

**EXTRACTION OF LEMONGRASS
(*Cymbopogon citratus*) OLEORESIN,
CHARACTERISATION AND SHELF
LIFE OF CYCLODEXTRIN-
LEMONGRASS OLEORESIN
INCLUSION COMPLEX**

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Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

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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. The 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.

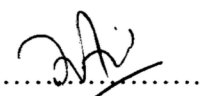
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ABSTRACT

Lemongrass is a well-known plant in Malaysia due to its lemony aroma used for cooking. Citral, which consists of two isomers, neral and geranial is the compound responsible for the unique flavour of lemongrass. Due to susceptibility of citral to oxidation, encapsulation of lemongrass oleoresin was carried out to increase stability of the oleoresin. Optimisation of lemongrass oleoresin extraction using Pressurised Liquid Extraction (PLE) was based on temperature, pressure and static time. The optimised PLE parameters obtained were temperature of 167.5°C, a pressure of 1203 psi and static time of 20 minutes. Sensory evaluation data revealed that the lemongrass extract obtained using standard PLE method (100°C, 1000 psi, 30 minutes) was significantly ($p<0.05$) more acceptable than the extract obtained from the optimised conditions. Phase solubility study concluded that β -cyclodextrin-lemongrass oleoresin inclusion complex was highly stable with stability constant (K_c) of 2091 M⁻¹ and 1192 M⁻¹ for neral and geranial; respectively. Lower K_c obtained for γ -cyclodextrin indicates formation of unstable inclusion complex with K_c values of 59 M⁻¹ and 51 M⁻¹ for neral and geranial; respectively. Inclusion complex of cyclodextrins-lemongrass oleoresin was formed using kneading, co-precipitation and physical mixture methods. Further characterisation of the complex using Differential Scanning Calorimetry (DSC), Fourier Transmission Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM) revealed that co-precipitation was able to form a new solid phase. However, based on kinetic modeling and percentage retention of neral and geranial upon storage, encapsulation of lemongrass oleoresin with cyclodextrins was unable to improve stability of compound neral and geranial upon storage for 217 days.

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