



**DEVELOPMENT OF EDIBLE OLEOGEL FOR CAPSAICIN DELIVERY**

By

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Sekian, terima kasih.

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## **DECLARATION BY AUTHOR**

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*Seng*

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## List of abbreviations and symbols

Abbreviation	Caption
ADRP	Adipocyte differentiation-related protein
CPT-1	Carnitine palmitoyltransferase I
CW	Candelila wax
DSC	Differentiation scanning calorimetry
GLUT4	Glucose transporter type 4
HMG-CoA	$\beta$ -Hydroxy $\beta$ -methylglutaryl-CoA
HOSFO	High oleic stafflower oil
PLM	Polarized light microscope
p-AV	P-anisidine value
PV	Peroxide value
XRD	X-ray differentiation

## PEMBANGUNAN OLEOGEL DALAM PENGHANTARAN CAPSAICIN

Capsaicin merupakan lipid bioaktif kompaun yang dapat meningkatkan metabolisme lemak dalam tubuh badan manusia. Akan tetapi, capsaicin merupakan bioaktif kompaun dan direndahkan dengan mudah dan juga menyengat. Oleogelation merupakan teknik novel yang dapat memerangkap minyak cecair dengan menggunakan oleogelator. Dalam kajian ini bertujuan untuk menjalankan penyelidikan tentang bioaccessibility capsaicin. Oleh itu, terdapat dua pembolehubah bebas telah dilaksanakan dalam kajian ini, iaitu kepekatan lilin (2 %, 4 % and 6 % w/w) dan penetapan suhu (5 °C, 15 °C and 25 °C) untuk menjalankan penyelidikan tentang ciri-ciri fizikal, kestabilan pengoksidaan dan kandugan capsaicin dan dikaji dengan menggunakan response surface methodology (RSM). Dalam kajian ini, didapati kekerasan, sifat terma (suhu penghabluran dan suhu lebur), dan pengoksidaan sekunder (nilai p-anisidin) telah meningkat secara ketara dengan menaikkan kepekatan lilin secara kesan kuadratik kecuali kekerasan meningkat secara linear tetapi suhu penghabluran tidak berkesan kepada ciri-ciri fizikal dan pengoksidaan. Dalam kajian ini kepekatan lilin mempunyai pengaruh besar terhadap ciri-ciri fizikal, namun penetapan tidak mempunyai pengaruh besar terhadap ciri-ciri fizikal. Dalam kajian ini, oleogel yang mempunyai 6% lilin mempunyai nilai tertinggi dalam setiap ciri-ciri fizikal. Akan tetapi, penetapan suhu dalam kajian ini tidak mempunyai kesan yang ketara terhadap ciri-ciri fizikal. Dalam kajian kestabilan pengoksidaan, oleogel yang mempunyai 6 % lilin dengan penetapan suhu pada 25 °C didapati mempunyai lebih kekal dan stabil dalam pengoksidaan dan nilai peroksida adalah  $2.37 \pm 0.03$  mmol/kg dan p-anisidin adalah  $3.69 \pm 0.27$ . Hal ini demikian kerana struktur oleogel boleh dianggap sebagai penghalanglindungan terhadap pengoksidaan. Sebagai akhirnya,

kandungan capsaicin didapati lebih tinggi dalam oleogel yang mempunyai 2% lilin.  
Namun demikian, tiada hubungan didapati antara dua faktor dan kandugan capsaicin.

## **DEVELOPMENT OF EDIBLE OLEOGEL FOR CAPSAICIN DELIVERY**

### **ABSTRACT**

Capsaicin is a lipid bioactive compound that can enhance the lipid metabolism in human body. However, capsaicin is pungent when consume and as lipid bioactive component it can be easily oxidized during storage. Oleogelation is a novel technique that entrap liquid oil by using oleogelator. The study was aim to develop oleogel using wax to deliver capsaicin. The effects of wax concentrations (2 %, 4 % and 6 % w/w) and crystallization temperatures (5 °C, 15 °C and 25 °C) on the physical and thermal properties, crystallization properties, oxidative stability, and capsaicin entrapment of the capsaicin oleogel were studied using response surface methodology (RSM). The hardness, thermal properties (crystallization and melting points) and secondary oxidation (anisidine value, AV) of the oleogel were significantly increased with the increase in wax concentration with quadratic effects except hardness showing linear effects but were not significantly influenced by crystallization temperature. Based on the result, it could be stated that concentration of wax had significantly influenced on most of the physical properties, whereas Tset were not greatly influence in most of the physical properties. In oxidative stability, it had been found that candelilla oleogel with 6 % wax and Tset of 25 °C had better oxidative stability where PV was  $2.37\pm 0.03$  mmol/kg and p-AV was  $3.69\pm 0.27$  compared to control. This was due to structure of oleogel that act as the protective barrier against oxidation. Last but not least, it was found that capsaicin content for candelilla oleogel with 2% had relatively higher than the others. However, the linkage did not determine between both variables and capsaicin content.