UNIVERSITI TEKNOLOGI MARA

FORMULATION AND OPTIMIZATION OF MEDIUM-CHAIN FATTY ACID NANO-EMULSION

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Dissertation submitted in partial fulfillment of the requirements for the degree of Bachelor of Pharmacy (Hons.)

Faculty of Pharmacy

April 2009

ACKNOWLEDGEMENT

In the name of Allah with most precious and most merciful,

First of all I want to express my thankful to Allah for giving me the encouragement to face all barriers and shortcoming while completing this thesis. It will be my honored to say thank you with sincere appreciation to all that contributed until my thesis successfully completed.

I want to take this opportunity to thank all who have assisted with the preparation of this thesis.

It wills my pleasure to express my salute and appreciation to Mr. Ahmad Mustafa Eid as for all of the knowledge, guidance, comments and patience throughout the progress of this thesis. I are awfully appreciated it.

Last but not least, I wish to thank our family especially my parent Sari'at bin Mokmin and Norintan bte Chokri and our friends for their support, encouragement, understanding and financing that give me strength and spirits to complete this thesis. Also to all that I may not list it here. Thank you very much.

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ABSTRACT

The aim of this study is to optimize the virgin coconut oil in formulation of nano-emulsion. In this study we prepare various formulations of emulsion consist of virgin coconut oil as disperse phase. From the formulations we prepare, we investigate the influences of Tween 80 as surfactant and Span 80 as co-surfactant in term of make the virgin coconut oil emulsion in nano range of size droplet. The result shows in ratio of 2:1 between virgin coconut oil and surfactant and ration 2:1 also between Tween 80 and Span 80 give us the smallest mean droplet size which is 0.186 μm. Moreover, we also investigate the nano-emulsion produced stability which we leave the nano-emulsion for one week in laboratory and measure the size particle again after that. The result was not significance change from 0.186 μm to 0.194 μm. As the conclusion, this research is really beneficial to optimize and find out the best possible formulation and production of the Virgin Coconut Oil nano-emulsion by self-emulsifying agent.

CHAPTER 1

INTRODUCTION

1.1 Introduction

An emulsions had been defined by the Internationally Union of Pure and Applied Chemistry (IUPAC) is "liquid droplets and/or liquid crystals are dispersed in a liquid" (Gutiérrez et al., 2008). Besides that, an emulsion also can be simply defined as ''a system comprised of two immiscible liquids, one of which is dispersed as droplets (the dispersed or internal phase) throughout the other (the continuous or external phase)'' (Jafari et al., 2007). Usually the dispersed and continuous phases are mixed together by surfactant or emulsifying agent. Classification of emulsions can be based on morphology. Emulsions those have water as a continuous phase and oil as a dispersed phase are called 'direct, water-based, and oil/water' emulsions. By contrast, 'inverse, oil-based, and water/oil' emulsions which are emulsions that have oil as a continuous phase and water as dispersed phase. For water as continuous phase emulsions usually use surfactant that generally soluble in the aqueous phase and provides more stability of water films and vice versa for oil as continuous phase emulsions (Mason et al., 2006). In this research, the oil/water (O/W) emulsion type had been chosen to study.

Nano-emulsions is an emulsions that consist of fine oil-in-water dispersions, having droplets covering the size range of 100–600 nm (Bouchemal et al., 2004). Nano-