

UNIVERSITI TEKNOLOGI MARA

**FORMULATION AND EVALUATION OF PALM
OIL AS MICRO AND NANOEMULSION**

KHUBAIB BIN AZAHARI

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ABSTRACT

Prized for its broad industrial application, Malaysian palm oil dominates the world market for palm oil and its derivatives. Palm oil unique composition means it is versatile in its application in cosmetical and pharmaceutical industry. Palm oil is natural occurring oil containing some of the antioxidant vitamin E constituents, tocopherols and tocotrienols. These natural antioxidants can act as scavengers of oxygen free radicals and are hypothesized to play a protective role in cellular aging. Nanoemulsions using palm oil as dispersed phase could enhance the pharmacological activity of the oil, through external application. In this study, nanoemulsion with single oil containing 15% of palm oil as disperse phase were prepared using lecithin (1 – 1.5%), Carbopol®934 (0.4%), Tween®80 (1 – 3%), Euxyl®K100 (0.1%) and Euxyl®K400 (0.05%). The emulsification methods used for the formation of nanoparticles were hand homogeniser and high pressure homogeniser. Both of the methods were carried out in order to obtain nanoemulsions with a small and narrow droplet size. The physical characteristics and stability of the nanoemulsions were studied. Properties such as visual aspect, particle size analysis, viscosity and pH were analysed at pre-determined time intervals (0, 1, 7, 14, 21, 28 days). It was followed by an assessment of stability via accelerated stability studies using dispersion analyser. Finally, panel's acceptance studies were carried out in 20 human volunteers with basis on sensorial tests. In conclusion, nanoemulsions formed by 15% palm oil, 1.5% lecithin, 3% Tween®80, Carbopol®934 (0.4%), Euxyl®K100 (0.1%) and Euxyl®K400 (0.05%) provided the best formulation in the study. From the sensorial test, the previous formulation showed a good acceptance in terms of colour, texture, oily capability and hydration. However, improvements on the lotion odour should be carried out to improve the panel's acceptance.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nanoemulsion is a new technology with very high promising applications, which can be used as a carrier in the medical field as well as in the cosmetic field (Sonneville, *et al*, 2004). In terms of its desired properties, nanoemulsion promotes absorption of active ingredients through the human skin, good physical properties and ease of preparation, and its organoleptic properties.

A lot of studies were done on nanoemulsion on every aspect covering nanoemulsion stability (Tadros *et al*, 2004), production method, materials used, type of emulsions and others but minimal studies were done using palm oil as the dispersed phase or continuous phase in formulating and production of nanoemulsion.

As we know, palm oil from oil palm (*Elaeis guineensis*) fruit extract had been one of Malaysia biggest export to neighbouring country and had been the source of income to our country, due to its variety of application and potential utilization into cosmetics and pharmaceutical industry. This study will cover nanoemulsion properties and stability using palm oil as a dispersed phase with different concentrations of surfactant and phospholipid.