

**UNIVERSITI TEKNOLOGI MARA**

**FORMULATION AND EVALUATION OF RICE  
BRAN OIL NANOEMULSION FOR COSMETIC  
APPLICATION BY USING SUCROSE  
MONOESTER**

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## ABSTRACT

Nanoemulsions are a class of emulsions with fine droplet size in the range of 20-500nm. Nanoemulsions are not thermodynamically stable and because of that their characteristics will depend on the preparation method. The aim of this study is to investigate the effect of formulation and preparation variables of nanophase gel as pre-nanoemulsion over nanoemulsion properties. Pre-nanoemulsion formulation was first developed by varying sucrose monoester, glycerol/water (8:2) and safflower oil composition to form cubical liquid crystalline system or nanophase gel. Then an emulsion in nano droplet size was produced by the mixing of pre-nanoemulsion with distilled water under gentle and agitation. The effects of different mechanical energy on droplet size and stability of nanoemulsion were then determined with respect to the variation of sucrose monoester and safflower oil composition. Pre-nanoemulsion formulation uses sucrose monoester combination produces smaller droplet size. However, pre-nanoemulsion formulation uses single sucrose monoester unable to produce nanoemulsion as it may separate after promote to the water. In this study, there was no significant different in particles size in terms of using different mechanical energy which were homogenizer and stirrer. The main mechanism of this nanoemulsion breakdown by using high energy emulsification method might be due to coalescence phenomenon. In addition, destabilization of nanoemulsion in long term process could be attributed to Ostwald ripening.

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

An emulsion is a system consisting of two immiscible liquid phases, one of which is dispersed throughout the other in the form of fine droplets. A third component, the emulsifying agent is necessary to stabilize the emulsion. The phase that is present as fine droplets is called the disperse phase and the phase in which the droplets are suspended is the continuous phase. Most emulsions will have droplets with diameters of 0.1 $\mu$ m-100 $\mu$ m and are inherently unstable system. Pharmaceutical emulsions usually consist of a mixture of an aqueous phase with various oils. If the oil droplets are dispersed throughout the aqueous phase the emulsion is term oil-in-water (o/w). A system in which the water is dispersed throughout the oil is water-in-oil (w/o) emulsion.

In this study, the emulsion that will be produce is oil-in-water emulsion which is containing nano size droplets. Basically nanoemulsions have the size range of 50 nm–1000 nm and they are kinetically stable systems with long term physical stability (against creaming or sedimentation, flocculation and coalescence). Nanoemulsions are easily formulated using proper choice of surfactants and/or polymers. Due to their small size they enhance penetration, spreading and will give uniform distribution on the substrate on which they are applied. These properties make nanoemulsion of interest for