UNIVERSITI TEKNOLOGI MARA

CHARACTERISATION AND STABILITY STUDY OF EMULSION LOADED WITH ZINC OXIDE OR TITANIUM DIOXIDE FOR COSMETIC APPLICATIONS

HANAAN BINTI MAHMUD

Dissertation submitted in partial fulfillment of the requirements for the

Bachelor of Pharmacy (Hons.)

Faculty of Pharmacy
July 2016

ACKNOWLEDGEMENT

I am utterly grateful to Allah for giving me another day to live my life and the opportunity to complete this final year project. A big thanks to both my supervisors, Dr. Khuriah and Dr. Tommy for guiding me throughout this two semesters in order to complete this study.

Thank you to my parents, En. Mahmud Ibrahim and for giving encouragement when needed.

To fellow friends and lab mates, who have been together till the end, thank you. A special thanks to Cik Nur Ain Kamal for assisting us during our labwork.

Lastly, thank you to myself for staying true to yourself till the end despite wanting to give up so many time. A pat back to myself for everything.

TABLE OF CONTENTS

	Page
TITLE PAGE	
APPROVAL SHEET	i
ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii-v
LIST OF TABLES	vi-vii
LIST OF FIGURES	viii
LIST OF ABBREVIATIONS	ix
ABSTRACT	x
CHAPTER ONE (INTRODUCTION)	1
1.1 Background of study	1-2
1.2 Problem statement	2-3
1.3 Objectives of study	3
1.4 Hypothesis	3
1.5 Output expectation	3
CHAPTER TWO (LITERATURE REVIEW)	4
2.1 Emulsion	4-5
2.1.1 Emulsifying agent	5-7
2.2 Stability of emulsion	8-10
2.3 Ultraviolet radiation	10-11

ABSTRACT

The aim of this study was to evaluate the physical characteristics and stability of creams formulated with a commercial thickening emulsifier (Gelinov®) that are loaded with zinc oxide or titanium dioxide. The study was done by conducting physical characteristics evaluation involving particle size analysis, texture analysis and Sun Protection Factor (SPF) analysis of the creams using Mastersizer 2000 (Malvern Instrument Ltd., UK), TA.XT Texture Analyzer (Stable Micro Systems, Goldalming, UK), and SPF-290S (Optometrics Corporation, USA), respectively. The stability study of creams was conducted using LUMiFuge (L.U.M. GmbH, Berlin, Germany). The results of this study show that the loading of zinc oxide or titanium dioxide contributes to the changes on the physical characteristics of the creams significantly. Additionally, a positive correlation was observed between SPF values and the concentration of zinc oxide or titanium dioxide.All the creams are noted to be stable for 6 month accelerated study using LUMiFuge stability analyzer.

CHAPTER 1

INTRODUCTION

1.1 Background of study

Emulsion, a liquid dispersed system, has two immiscible liquids, with one of the liquid dispersed in the other liquid phase as globules. The diameter of the droplet of the dispersed phase range from 0.1 to 10 μm, but droplet diameter from as small as 0.01μm to as large as 100 μm is also common (Dash, et al., 2013). Emulsion also contain surface active agent known as emulsifying agent that help in the formation of the emulsion by decreasing the interfacial tension between the two immiscible liquids for easier formation of emulsion and also help to stabilize the formation of the dispersed phase against coalescence. Two broad classifications of emulsions are simple emulsions and multiple emulsions. Simple emulsion can be divided into two: water-in-oil (W/O) and oil-in-water (O/W) emulsions. This is based on what is the dispersed phase inside a continuous phase, with the W/O emulsion having a water dispersed phase in an oil continuous phase while O/W emulsions having oil dispersed phase in a water continuous phase. For multiple emulsions, or also known as double emulsions, it is a condition where globules of a multiple emulsion contain much smaller droplets inside the said globule. Multiple emulsions can be simplified