

UNIVERSITI TEKNOLOGI MARA

**PHYSICAL CHARACTERISATION OF
CONVENTIONAL
TOOTHPASTES FOR ADULTS
IN MALAYSIA**

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

2015

ACKNOWLEDGMENTS

I am using this opportunity to express my gratitude to everyone who supported me throughout the course of this final year project. I would like to thank to them for giving me guidance, and advice during the project work.

First of all, I would like to thank to my supervisor Dr Norhayati Abu Samah for giving me the greatest opportunity and make me to have interest in conducting the final year project under the department of Nutraceutical and Cosmeutical. I also want to give my greatest gratitude for the help and support and advice which help me to complete my final year project.

I am also would like to convey my gratitude to my co supervisor Dr Tommy Julianto Bustami Effendi for helping me in the completion of my final year project. Nevertheless, I would like to thank all my fellow friends for giving me advice and encouragement to conduct this project.

My gratitude

Muhammad Fahmi Bin Azizan

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ABSTRACT

Physical characterization of conventional toothpaste in term of rheological, textural, foaming ability and stability properties are influenced by their compositions and formulations. The objective of this study is to assess the physical characteristics of conventional toothpastes by performing rheology and texture profiling; pH and foaming ability analyses; and accelerated stability study. The proposed project covered, virtually all conventional toothpastes for adults offered for sale in Malaysia. Droplet size distribution of the toothpastes were performed for identification of Droplet size distribution (μm) with polydispersity of the samples reflected by span and uniformity values. The determination of viscosity and mechanical response were done through rheological analysis with response to shear stress analysis and dynamic oscillatory. Textural characterization including firmness, cohesiveness and consistency as parameters was done by using the back extrusion method. Stability of the toothpastes was performed by using accelerated method (32°C ; 2500rpm) in order to predict the toothpastes stability for two years. Besides, pH reading of toothpastes were performed at room temperature (25°C). The foaming ability and foam stability analysis were used to determine foam expansion and foam volume stability through cylinder method. Based on the result, 10 toothpastes exhibited thixotropic (pseudoplastic) behaviour. Toothpastes that contain additional flavouring agent exhibited a higher value of viscosity. All the toothpaste exhibited elastic behaviour; $G' > G''$. The stability analysis, only one toothpaste sample exhibit low stability property for a given two stability analysis (Pepsodent). As conclusion, most of conventional toothpastes had different flow properties due to the presence of additives and thickening agents in the formulations. Moreover, the age of conventional toothpastes between manufactured date and expiry date might also influence their stability as well as droplet size, rheological, textural, pH and foam properties.

Chapter 1

INTRODUCTION

1.1 Background study

American Dental Association (ADA) had described toothpaste as a paste or gel containing active substances that help to remove bacteria and plaque that exist on the teeth structure and buccal cavity (“Malaysian Dental Association”),(Brown, 2006). The main function of toothpaste is as a cleaning agent to maintain and improve oral health and aesthetics. Since their introduction decades ago, toothpaste formulations had evolved considerably, from suspensions of crushed egg shells or ashes to complex formulations containing several ingredients. In modern days, toothpastes are formulated in a form of paste or soft gel. Paste is defined as a dispersion of high concentrations of solid materials in aqueous or oily vehicle. Paste also known as semi solid preparation purposely used for external preparation. Whereas soft gel is characterize as a liquid or semisolid matrix dosage form containing gelatin, plasticiser, and other additives (A.J Winfield, J.A. Rees, I. Smith, 2009).

Generally, a toothpaste formulation contains active ingredients that are largely responsible for the therapeutic benefits such as to combat dental carries, plaques, gum disease, erosion and dentin hypersensitivity. Moreover, it also contains excipients including abrasives to clean and whiten teeth, surfactants responsible for the foaming action, flavours for the purpose of breathe freshening and dyes for better visual appeal. The inclusion of excipients in the formulations does largely influence the physical characteristics (e.g. rheology, pH and texture) of the toothpastes (Çiftçi, Kahyaoglu, Kapucu, & Kaya, 2008). For example, abrasive agents such as calcium carbonate and alumina were the most conventional toothpaste excipient and contribute