DETERMINATION OF TOTAL PHENOLIC CONTENT IN CHOCOLATES

JESSICA NGO

Final Year Project Report Submitted in
Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science (Hons.) Chemistry
in the Faculty of Applied Sciences
Universiti Teknologi MARA

NOVEMBER 2009

ACKNOWLEDGEMENTS

Upon completion of this project, I would like to express my gratitude to many parties. My heartfelt thanks goes to my supervisor, Puan Mashita Abdullah @ Mohd Noor for her kind guidance, encouragement, ideas and moral support throughout the preparation of my final year project.

I would like to extend my special gratitude to all Applied Chemistry laboratory assistants for their help and cooperation.

Finally I also love to express my thankful to my beloved parents for their trust and encouragement in supporting me to complete my final year project. Not forgotten, to my friends for their kindness to share the information.

Thank you.

Jessica Ngo

TABLE OF CONTENTS

ABSTRACT

DETERMINATION OF TOTAL PHENOLIC CONTENT IN CHOCOLATES

This study was conducted to determine the total phenolic content (TPC) in chocolates and also to compare the total phenolic content between dark chocolate and milk chocolate. Two types of brand of chocolate product were used in this study, which were Belgian chocolate and Vochelle chocolate. The total phenolic content was determined by Folin-Ciocalteau reagent with gallic acid as the standard using UV/Vis spectrophotometer. The total phenolic contents of the chocolate samples were determined from the calibration curve of absorbance versus gallic acid concentrations in the range of 0 to 50 ppm. The results were expressed in gallic acid equivalent (mg GAE/g). Result obtained showed that dark chocolate had higher total phenolic content (12.576 ± 0.3671 and 14.966 ± 0.5279 mg GAE/g) than the milk chocolate (1.3105 ± 0.0977 and 5.4740 ± 0.1321 mg GAE/g). Hence, dark chocolate can be a good source of antioxidant since it contains more cocoa.

CHAPTER 1

INTRODUCTION

1.1 Background and problem statement

Cocoa is the unprocessed cocoa bean from the plant *Theobroma cacao* and originated deep in the equatorial rain forests of the Americas. The term "cocoa" can be referred as (i) drink commonly known as hot chocolate; (ii) cocoa powder, the dry powder made by grinding cocoa seeds and removing the cocoa butter from the dark, bitter cocoa solids; or simply (iii) the combination of both cocoa powder and cocoa butter together. Chocolate was first discovered by the Mayas when they used the cocoa bean from the Cacao tree as an ingredient in their favourite drink "xocotlatl". In fact, cocoa is the main raw ingredient for the world chocolate industry, which is estimated to be approximately $58 billion per year (Piasentin, 2004).

Cocoa contains rich source of antioxidants including the flavan-3-ols, epicatechin and catechin, and their oligomers (procyanidins). An antioxidant is a substance that inhibits oxidation or reactions promoted by oxygen and peroxides, and that include many held to protect the living body from the deleterious effects of free radicals. Chocolate and cocoa contain a high level of flavonoids, specifically epicatechin, which may have beneficial cardiovascular effects on health (Taubert *et al.,* 2007; Schroeter *et al.,* 2006). Cocoa contains high concentrations of polyphenols — about 8 per cent by weight in the raw beans.