# THE DETERMINATION OF CAFFEINE CONTENT IN TEA USING HEADSPACE SOLID PHASE MICROEXTRACTION (HS-SPME) AND GAS CHROMATOGRAPHY-MASS SPECTROMETRY (GC-MS)

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## TABLE OF CONTENTS

## ABSTRACT

### THE DETERMINATION OF CAFFEINE CONTENT IN TEA USING HEADSPACE SOLID PHASE MICROEXTRACTION (HS-SPME) AND GAS CHROMATOGRAPHY-MASS SPECTROMETRY (GC-MS)

This study was conducted to determine the caffeine content in different types and brands of tea which are black tea, oolong tea and green tea and to identify the major volatile compounds present in those tea by using headspace-solid phase microextraction (HS-SPME) with gas chromatography-mass spectrometry (GC-MS). About 1 g of dry tea leaves from tea samples were extracted by using polydimethylsiloxane/divinylbenzene (PDMS/DVB) fiber at 50 °C for 40 min. The quantification of caffeine was calculated based on calibration curve of standard caffeine. The result shows that green tea has the highest amount of caffeine, followed by oolong tea and black tea. While in the analysis of four brands of black tea, brand D has the highest caffeine content, followed by brand C, brand B and brand A. The major volatile compounds present in black tea, oolong tea and green tea are benzaldehyde, D-limonene, cyclopentasiloxane, methyl salicylate, tetradecane and caryophyllene. In this study, D-limonene is only present in green tea. Therefore, it can be used as the reference volatile compound to differentiate between unfermented green tea and fermented tea such as black tea and oolong tea.

# CHAPTER 1

# INTRODUCTION

## 1.1 Background of study

Tea is known as the second most popular beverages in the world after water. Tea has a variety of types and all types of tea are made from the leaves of plant species of *Camellia sinensis* and it belongs to the *Theaceae* family (Sereshti *et al.,* 2013). Generally, teas are classified into three categories which are fully-fermented black teas, semi-fermented oolong teas and unfermented green teas (Wang *et al.*, 2008). Black tea is the most popular type of tea consumed by people around the world.

Malaysia has its own tea plantation and Cameron Highlands is one of the biggest tea plantations in Asia. The biggest production of tea in Cameron Highlands is black tea, followed by oolong tea and green tea. The famous brands of black tea in Malaysia include Boh, Lipton and Sabah Tea. The fermentation or oxidation process of black tea causes the dark brown colour to the tea. Meanwhile the green tea retains the green colour of the leaves due to its unfermented process. Oolong tea is known as semi-fermented tea and the colour is quite similar to the black tea.