

**MICROWAVE-ASSISTED HYDRODISTILLATION OF ANNONA
MURICATA**

JEALONOVIER SAYAS ANAK JEMON

**This report is submitted in partial fulfillment of the requirements needed for the
award of Bachelor in Chemical Engineering (Hons)**

**FACULTY OF CHEMICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
SHAH ALAM**

JULY 2017

ACKNOWLEDGEMENT

Firstly, I wish to thank God for giving me the opportunity to complete this challenging journey. My gratitude and special thanks go to my supervisor Dr Atikah Kadri. Thank you for the support, guidance and ideas in assisting me with this project. I also would like to express my gratitude to the staff of Universiti Teknologi Mara, especially for the laboratory assistant for providing the facilities and assistance during the experiment.

Special thanks to my friends for helping me with this project by providing the raw materials. Finally, this thesis is dedicated to my family for the encouragement and determination to educate me.

ABSTRACT

Essential oil from natural products contains abundant medicinal and therapeutic values. *Annona Muricata* itself had proven to have significant antioxidants and anticancer activities. The development of microwave-assisted hydrodistillation (MAHD) as the alternative extraction methods has gain a lot of attention to produce better quality of essential oil over shorter period of time to overcome to increasing demand of essential oil worldwide. The study aimed to compare the conventional hydro-distillation (HD) and microwave-assisted hydro-distillation (MAHD) to evaluate their effectiveness in the extraction of essential oil from *Annona Muricata*. The effect of different parameters, such as extraction methods (hydro-distillation and microwave-assisted hydro-distillation) and microwave power on the extraction yield, extraction time and its major chemical compounds were investigated. 100 grams of *Annona Muricata* leaves were immersed in distilled water and heated by different heating medium, that are heating mantle and microwave oven, using the Clevenger extraction apparatus. The extraction was then carried out under three microwave power levels (100, 300 and 600 W) to determine the best power for higher yield of essential oil. The result found out that MAHD had produced higher yield than HD (0.045%) over shorter period of time (180 minutes). The best microwave power to produce higher yield was found at power level of 600 W with the yield obtained under this condition was 0.045% w/w. Yellowish white essential oil with a strong smell was extracted and the chemical compounds were analyzed using gas chromatography-mass spectrometry (GC-MS). MAHD (600 W) was found to be effective in producing higher yield at shorter extraction time.

TABLE OF CONTENTS

	PAGE
AUTHOR’S DECLARATION	ii
SUPERVISOR CERTIFICATION	iii
COORDINATOR CERTIFICATION	iv
ACKNOWLEDGEMENT	v
ABSTRACT	vi
TABLES OF CONTENT	vii
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF PLATES	xiii
LIST OF ABBREVIATIONS / NOMENCLATURE	xiv
CHAPTER 1	INTRODUCTION
	1.1 Research Background 1
	1.2 Problem Statement 3
	1.3 Objectives of Research 4
	1.4 Scope of Research 5
CHAPTER 2	LITERATURE REVIEW
	2.1 Introduction to Essential Oil 6
	2.2 Pharmacological Activities of Essential Oil 8
	2.3 Cancer 11
	2.4 Cancer Statistics 13
	2.5 Antioxidant activities 16
	2.6 Introduction to <i>Annona Muricata</i> Linn 17
	2.7 Phytochemistry of <i>Annona muricata</i> 19

CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

Essential oils are natural products that are usually extracted from the plant, which are useful in daily life as food flavoring, fragrances and also contained traditional values and pharmaceuticals potentials. Over centuries, the extraction methods have been developed to produce more essential oils from natural sources such as plant with medicinal value or herbs (Wang et al., 2010). Essential oils are chemical constituents that made up of mixtures of aromatic and volatile substances generally present at low concentrations (Costa et al., 2015). The essential oils have gain a lot of attention their beneficial uses in many industries have been stronger recently. For example, demand in natural medicine (Elaissi et al., 2012), negative response from consumer of synthetic food preservatives (Jiao et al., 2012), natural aromatherapy (Jeyaratnam et al., 2016) and natural antioxidants sources (Harkat-Madouri et al., 2015).

Annona muricata or also known as *Annona muricata* Linn is belong to the Annonaceae family. It is among the tropical fruits that are considered as beneficial and receive a lot of interest due to its therapeutic potential and medicinal value. The medicinal advantages of *Annona muricata* have attracted the attention due to its bioactivity and toxicity (Coria-Téllez et al., 2016). *Annona muricata* is a native plant found in warmest tropical regions in South and Central America and nowadays can also be found in other tropical countries, including Western Africa, India and South East Asia (Moghadamtousi et al., 2015).

Among the industrial applications of the essential oils extracted from the soursop pulp is improving the flavor in the processed fruits. This is because the presence of esters of aliphatic acid in the pulp extracts that have the potential to give tasty flavor. Meanwhile, the essential oil from the soursop leaves containing chemical components such as δ -cadinene, epi- α -cadinol and α -cadinol (Moghadamtousi et al., 2015).