SUPERCRITICAL CARBON DIOXIDE EXTRACTION AS A GREEN TECHNOLOGY FOR *CHROMOLAENA ODORATA* LEAVES

FARAHHANIS BINTI TUAH

BACHELOR OF CHEMICAL ENGINEERING (ENVIRONMENT) WITH HONOURS

UNIVERSITI TEKNOLOGI MARA

2017

AUTHOR'S DECLARATION

I declare that the work in the thesis was carried out in accordance with the regulation of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as reference work.

I, hereby acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

Signed : .....

Date : 10/7/2017

FARAHHANIS BINTI TUAH

Student ID : 2014868664

SUPERVISOR'S CERTIFICATION

We declared that we read this thesis and in our point of view this thesis is qualified in terms of scope and quality for the purpose of awarding the Bachelor of Chemical Engineering (Environment) with Honours.

Signed : .....
Date : 06/07/17

Main supervisor
Nur Ain Mohd Zainuddin
Faculty of Chemical Engineering
Universiti Teknologi MARA
Cawangan Pulau Pinang
13500 Permatang Pauh
Pulau Pinang

Signed : .....
Date : 10/07/17

Co-Supervisor
Ir Mohd Azahar Mohd Ariff
Faculty of Chemical Engineering
Universiti Teknologi MARA
Cawangan Pulau Pinang
13500 Permatang Pauh
Pulau Pinang

Ir. MOHD AZAHAR MOHD ARIFF
Pensyarah Kanan
Fakulti Kejuruteraan Kimia
Universiti Teknologi MARA
Cawangan Pulau Pinang
13500 Permatang Pauh

ACKNOWLEDGEMENT

Firstly, I would like to express my grateful and thankfulness to Allah S.W.T. for His blessings and perseverance that He has been bestowed upon me during this research project to accomplished this Final Year Project 2.

I would like to give my appreciation to my final year project supervisor, Madam Nur Ain Binti Mohd Zainuddin for her guidance, encouragements, critics and her time. She has been helpful throughout the research by giving advices and ideas to help me improving my Final Year Project 2.

I would also want to extend my appreciation to my family and friends who supported me the entire time and for all their doa for me. They gave me the strength to go through the difficulties that I had face throughout finishing this final year project.

Finally, I would like to express my appreciation to the laboratory technicians of Chemical Engineering Faculty who are very helpful and patient in order to fulfill my needs for the experimental information of this project. Thank you all.

ABSTRACT

Relatively previous researches on *Chromolaena odorata* were undergone by using traditional method such as hydrodistillation and soxhlet extraction methods which have their own disadvantages such as long extraction time and non-solvent free oil extract. Thus, a clean extraction method of Supercritical Fluid Extraction (SFE) method using Supercritical Carbon Dioxide (SC-CO_2) with ethanol as co-solvent was proposed for the extraction of *Chromolaena odorata* leaves to produce oil with bioactive components. The SC-CO_2 extraction of *Chromolaena odorata* was studied by using measurement of yield, solubility and component identification. The extraction was conducted at constant CO_2 flowrate of 24mL/min and constant ethanol flowrate of 2.4mL/min at extraction time of 60 minutes within a range of temperature (40°C, 45°C and 50°C) and range of pressure (3000, 3500, 4000, 4500 and 5000 psi). The component in *Chromolaena odorata* oil with the highest oil yield was determined by using Gas Chromotography-Mass Spectrometry (GC-MS). The highest extraction oil yield of 51.20% (g oil/ g sample) and solubility of 7.619 mg oil/ g CO_2 in SC-CO_2 was obtained at pressure 4000psi and temperature 50°C. The component in the oil extract with the highest oil yield was determined where the major components identified were α-cubebene, bicyclo [7.2.0] undec-4-ene, germacrene D and caryophyllene.