

UNIVERSITI TEKNOLOGI MARA

**PROFILING OF VOLATILE
ORGANIC COMPOUNDS (VOCs)
EVOLVED FROM DELAYED
STORAGE OF LOCAL HOUSEHOLD
FOOD WASTES AND ITS
POTENTIAL HEALTH RISK**

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Thesis submitted in fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Chemical Engineering)

Faculty of Chemical Engineering

April 2021

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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

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ABSTRACT

Food waste are easily degradable during storage, producing large quantities of VOCs that are harmful to human health. The thesis discussed VOCs from delayed storage of local household food waste and its potential health risk. Using a bioreactor, this study measured the production of VOCs at three parameters at four different temperature 20°C, 30°C, 40°C and 50°C for 21 days. The stud has the following objectives: 1. To develop a bioreactor for simulating real storage bin and to categories the composition of local household waste at selected residential area. 2. To investigate the emission of Volatile Organic Compounds (VOCs) released during the decomposition of local household food waste by considering different abiotic factors such as temperature, refuse age, relative humidity, moisture contents, oxygen level and pH in a bioreactor using Thermal Desorption-Gas Chromatography Mass Spectrometry (TD-GCMS). 3. To analyse the patterns of VOCs released during decomposition of waste using Artificial Neural Network (ANN) 4. To evaluate the potential health risk of waste collector to the VOCs arising from the extended storage of food waste using USEPA method. Overall, the significant association was found between VOCs emission and temperature, pH, relative humidity, oxygen level with the p-value<0.05. There is no significant different between levels. Determination of VOCs pattern using ANN, which utilized a multilayer feed forward back propagation with one hidden layer and seven hidden neurons, was found to be effective in predicting experimental data, thus saving time and cost for VOCs prediction. In Malaysia, lacking of study as well as lacking of awareness in both workers and municipality may impose detrimental health effect during waste collection. Therefore, this study provides health impact assessment with calculated hazard index between 0.1 and 1 for noncarcinogenic effects, which may cause long term issues among workers. Although carcinogenic risk posed by benzene and ethyl benzene was below the acceptable range, the concentration of these compounds is much higher than other types of VOCs.

ACKNOWLEDGEMENT

In the name of Allah, The Most Gracious, The Most Merciful.

Alhamdulillah, all praises to ALLAH the Almighty who help me and gave me strength, inspiration and patience to successfully complete this long and challenging research journey. My gratitude and thanks goes to my very supportive supervisor Prof.Dr. Ku Halim Ku Hamid, for his continuous guidance, ideas, prayer, and assisting throughout my difficulties in this project. Special thanks and appreciation also goes to my supportive co-supervisor Ass.Prof Dr. Kamariah Noor Ismail and Ass.Prof. Dr. Zulkifli Abdul Rashid for their willingness in motivating and helping me to complete this journey.

I would also like to convey my heart and appreciation to all my colleagues in Centre for Environmental Health and safety Studies, Faculty of Health Sciences, Faculty of Chemical Engineering and my beloved friends, who have directly or indirectly contributed and become part of my experience in finishing my study.

Finally, this thesis dedicated to my beloved husband, Nasrul bin Basiran and my son Muhammad Adli Nawfal bin Nasrul for their love, patient, understanding, prayers and continuing support. I am extremely grateful to my parents Mohd Yatim bin Haji Abdul Manan and Siti Fatimah binti Kayat for their love and sacrifices for educating and preparing me for my future. Also, I express my thanks to my beloved brothers, sisters and in laws, for their support and prayers. This piece of victory is dedicated to all of you. Thank you. Alhamdulillah.

Sincerely

Siti Rohana Mohd Yatim

2021

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