

INDUSTRIAL TRAINING REPORT

EMZI – UiTM NANOPARTICLE COLLOIDS & INTERFACE INDUSTRIAL RESEARCH LABORATORY (NANO-CORE)



اَوَّلُ سَبِيْقِي تَكْوِيْنُ لَوْ كُنَّ مَرَا
UNIVERSITI
TEKNOLOGI
MARA



DIPLOMA OF CHEMICAL ENGINEERING WITH HONOURS UNIVERSITI TEKNOLOGI MARA (UiTM) PASIR GUDANG 2021

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ACKNOWLEDGEMENT

First and foremost, Alhamdulillah and grace to Allah S.W.T. for granting me the opportunity of carrying out and complete my industrial training successfully and in accordance with the faculty's requirement. This is written based on my internship experiences with the EMZI Holdings Sdn. Bhd.

I wish to express my deepest gratitude towards my PA, Sir Haikal for his guidance throughout my industrial training weeks. Furthermore, I would like to give my appreciation to the lecturer of UiTM Pasir Gudang that has involved in evaluating my performance, Puan Hazwani Hanib.

Following that, I would love to grant my sincere gratitude and appreciation to Mr. Muhammad bin Ismail, Production Executive cum Industrial Training Co-Supervisor, the General Manager, on the chances given by accepting me to undertake my industrial training at EMZI – UiTM Nanoparticle Colloids & Interface Industrial Laboratory (Nano-Core), an industrial collaboration project between School of Chemical Engineering, College of Engineering, UiTM Cawangan Pulau Pinang and EMZI Holdings Sdn. Bhd. It was an exceptionally fun and interesting experiences and I have nor even a second not enjoyed any works done.

Not to mention, expressing my utmost gratitude and appreciation to Ts. Mohamed Syazwan bin Osman my industrial supervisor, as well as Miss Khairunnisa Khairudin for giving needed guidance throughout my internship continuously until the edge of my internship duration. Besides that, I would also like to thank my lab partners, Nor Fatimah binti Roslan and Kamelia binti Kharuddin for given a place for me to be involved in this intriguing project.

Lastly, I humbly wish to express my heartfelt appreciation and thanks to my family, friends, as well as all the UiTM Pulau Penang staff members that I have directly or indirectly encountered, for all the care and support.

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EXECUTIVE SUMMARY

The nanoparticles for the mask application project, an industrial collaboration project between EMZI Holdings Sdn. Bhd. with School of Chemical Engineering, UiTM Cawangan Pulau Pinang located inside the campus. This project is a new idea of an invention that serves for the community benefits and could increase more knowledge on how the use of nanoparticles can affect the level of bacteria protection when it is applied as a medium in the mask. Not to mention, this project might act as a learning area for chemical engineering students, in becoming an entrepreneur or at least increase own interest in creating a business that applies the knowledge of this specific course taken. This project must follow precise temperature control to reach optimum level for higher percentage of reaction to occur. This project consisting of two main materials which are copper (II) and silver nitrate in producing the nanoparticles. Combining agents that are used for trying and error operation is ethylene glycol, polyvinylpyrrolidone and hexane. Assisting and taking part in the project along with two of degree students, Nor Fatimah binti Roslan and Kamelia binti Kharuddin. This project has taken place in laboratory 2 of UiTM Pulau Pinang branch.

Throughout the operation of this project, two extra researches were conducted in favor for the participation in a conference. Each research is mainly in relation to air pollution with Covid-19 based on analyzing a list of numerous data by using different methods. The first research journal entitled 'Air quality assessment using OpenAir in Seberang Jaya, Penang During Movement Control Operation (MCO)' for the Virtual Colloquium Series 2020-2021: International Symposium on Environmental and Green Chemistry for Sustainable Development 2021 (EnvChem 2021). Analysis was conducted to observe varieties of major air pollutants as it is believed that the implementation of MCO affects the amount of air pollution being released. Subsequently, a research journal entitled 'The relationship between air pollution and Covid-19 related cases/deaths: A case study in Klang Valley, Malaysia' for the 5th International Conference on Global Sustainability and Chemical Engineering (ICGSCE 2021). Further analysis of variety of data gained with the use of ANN machine to prove the effects of air pollution with the spreading rate of Covid-19.

CHAPTER 1

INTRODUCTION TO PRACTICAL TRAINING

1.0 Introduction

This internship program is a mandatory course that must be done by all students of the Chemical Engineering before finishing diploma of Faculty of the Chemical Engineering, EH110. To complete this course, undertaking internship requirement must be fulfilled to enable graduating from the university. Industrial training helps students to gain work experiences that are in relation to the course taken in its' professional development prior to graduation for the diploma taken. The internship consists of 16-week duration allocated at any chosen job offered for training by the students themselves. There is no limitation inflicted towards all students, whether they may work in government agencies or private organizations.

I, Tengku Shamim Amelin Binti Tengku Zahidi (2018421944) has started to work in EMZI Holdings Snd. Bhd. as an intern under Ts. Mohamed Syazwan Bin Osman as the supervisor allocated in UiTM Pulau Pinang starting from the 22nd of March 2021 until 16th of July 2021.

1.1 Objectives of Industrial Training

The objectives of the industrial training are as listed:

- I. To attain the requirement for the students to graduate from this course
- II. Apply theories learnt in classroom in working conditions
- III. Improve communication and management skills
- IV. Improve students' confidence after graduation
- V. Improve both soft and hard skills
- VI. Acquiring work experiences

CHAPTER 2

INTRODUCTION OF COMPANY



Figure 1. EMZI Holdings Sdn. Bhd. company logo

2.0 Company's Background

The EMZI Holdings Sdn. Bhd. was officially established back on the 22nd of October 2015 by a wholly Islamic Bumiputera owned company registered under Suruhanjaya Syarikat Malaysia (SSM). The head office was pinpointed at No. 5 & No. 6, Tingkat 1, Jalan Bank, 08000 Sungai Petani, Kedah Darul Aman. The two-existing branches of EMZI Health Science Sdn. Bhd. are located at H-1, Persiaran 2/1 Kedah Halal Park, 08000 Sungai Petani, Kedah and the EMZI Holdings Sdn. Bhd. (Selangor) at 92A, Jalan BP 7/8, Bandar Bukit Puchong, 47100 Puchong, Selangor. EMZI Holdings Sdn. Bhd. is more focused and specialized in products that are related to healthcare products, event management services and general trading. For the marketing of the product, it is mainly using single level marketing or online marketing method through a list of subsidiaries. This company thrives in creative and innovative ways in producing products that are based on continuous research of all sorts and make certain that the products are all safe and accepted throughout the community.

Furthermore, this company is quite active in contributing towards the community, in which the idea of having and carrying out industrial collaboration with UiTM Cawangan Pulau Pinang, Permatang Pauh campus. The collaboration between EMZI Holdings Sdn. Bhd. and UiTM was established in the year of 2020, under the EMZI – UiTM Nanoparticle Colloids & Interface Industrial Research Laboratory (NANO-CORE) under School of Chemical Engineering, College of Engineering, UiTM Cawangan

Pulau Pinang. One of the biggest projects done is the Microfarm@FKK project, under the Micro Industry Hub (MIH) program managed by Business Innovation and Technology, Commercialization (BITCOM) UiTM in 2021. This project was conducted in applying the concept of smart and precise agriculture method inside the campus and to see its impact to the local community. This project also in collaboration with the Federal Agricultural Marketing Authority (FAMA) Seberang Perai Tengah Office, on the process of commercializing the crops produced later from this project. This project also has direct supervision from the Student's Affair Division (HEP) and Research, Industry, Community and Alumni Network Division (PJIM&A), UiTM Cawangan Pulau Pinang on the development of student's social and entrepreneur development.

Then, the invention of nanoparticles for face mask project was born, under Ts. Mohamed Syazwan Bin Osman managed by the two degree students, Nor Fatimah binti Roslan and Kamelia binti Kharuddin of Faculty of Chemical engineering UiTM Pulau Pinang in 2021. This project will be subjected at laboratory 2 UiTM Pulau Pinang.



Figure 2. Laboratory 2 UiTM Pulau Pinang



Figure 3. Collaboration between EMZI Holdings Sdn. Bhd. with UiTM Cawangan Pulau Pinang

2.1 Vision & Mission

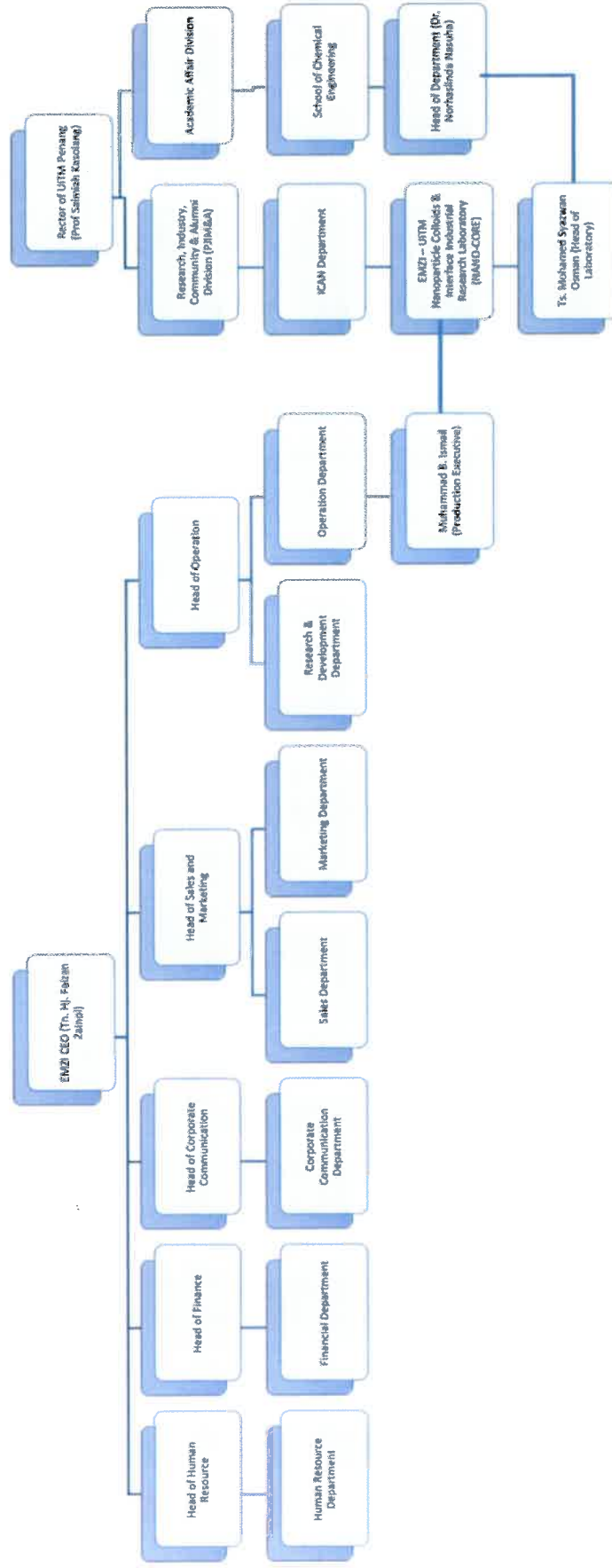
Vision

Becoming the best Muslim native company in the field of online business.

Mission

To achieve consistency sales units per month in a professional and fun work environment as well as shariah compliant.

2.2 Organizational Chart



2.3 General Rules & Regulations

Required to comply with any general rules, procedures, regulations, and agreements currently in force on or that which may hereafter be introduced / made by the company covering terms and conditions of service, discipline, misconduct, security and any such matters which affect oneself present and future employment/internship with the company.

2.4 Confidentiality

Under no circumstances, divulge to any person or organization outside of the company a secret or information in connection with the business, operation and activities of the company which may acquire during or incidental to employment/internship in the company.

2.5 Conduct & Discipline

Expected to observe discipline and conduct oneself in the manner that will always project a good image of the company. Acts of misconduct which are likely to result in the termination of service without notice include dishonesty, absent without leave or permission, persistent lateness, and such others as may bring the company or the company's employees into disrepute.[1]

2.6 Job scopes of Industrial Training

Listed below are the scopes that I was exposed throughout my internship that are in relation to my field of study, Chemical Engineering. The exposures given on these scopes are in the form of lab sessions, research, reading material, writing and slide presentation. The scopes are:

- OpenAir application
- Nanoparticle lab
- Conference
- Data analysis
- Research journal
- ANN machine

EMZI Sdn. Bhd. has its own fixed hours. However, there are differences between the company's main office base and UiTM Pulau Pinang base. Below is the schedule on working hours:

	EMZI Sdn. Bhd. offices	UiTM Pulau Penang
Working day	Monday to Friday	Monday to Friday
Working hour	9am to 6pm	8am to 5pm

2.7 Industrial Training Schedule

No.	Scope	Start Date	Finish Date	Training Period
1	<ul style="list-style-type: none">- Introduction to management and organization- Briefing on roles and responsibilities- Briefing on rules and regulations- Touring around the working space	22.03.2021	26.03.2021	1 week
2	<ul style="list-style-type: none">- Learning to operate OpenAir application- Air pollution analysis- Journal writing on OpenAir air pollution	22.03.2021	10.06.2021	11 weeks

	<ul style="list-style-type: none"> - EnvChem 2021 conference participation 			
3	<ul style="list-style-type: none"> - Searching nanoparticle production methods - Try and error lab sessions - Characterization of nanoparticles - Taking notes of lab progress 	24.05.2021	15.07.2021	8 weeks
4	<ul style="list-style-type: none"> - Learning to operate ANN machine. - PM10 and PM2.5 pollution analysis - Journal writing on Covid-19 and air pollution - ICGSCE 2021 conference participation 	21.05.2021	01.08.2021	11 weeks

2.8 Industrial Training Tasks (Gantt Chart)

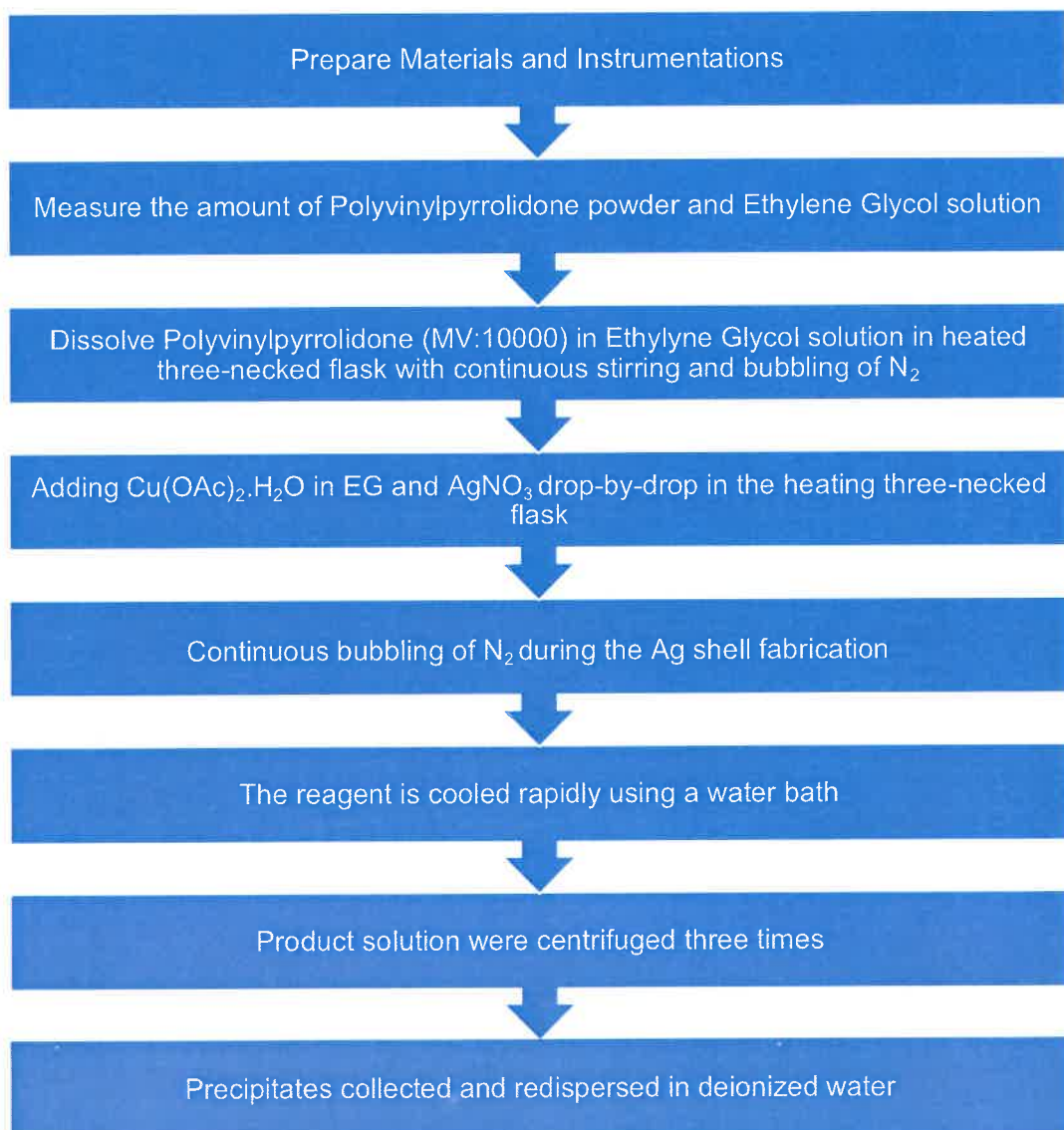
Task	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	
Reporting to Industrial Training Supervisor																		
Briefing on tasks throughout the training																		
Collecting air pollution/Covid-19 data																		
Rearranging air pollution data																		
Learning to use OpenAir software application																		
Research on methodology and instrumentation for nanoparticle productions																		
Journal writing for EnvChem 2021																		
Journal draft submission																		
Manuscript submission to conference organizer																		
Discussion with supervisor																		
Nanoparticles' production lab sessions																		
Air pollution analysis using the OpenAir software																		
Characterization of nanoparticles																		
Conference Participation																		
Internet research on the working topic																		
Gathering related journals and articles																		
Learning how to use ANN machine																		
Journal writing for ICGSCE 2021																		
Prepare for presentation																		
Intern logbook writing																		
Intern report writing																		

CHAPTER 3

INDUSTRIAL TRAINING ACTIVITIES

3.0 Process Flow

3.0.1 Process Flow of Production of Nanoparticle using Silver Nitrate and Copper (II).



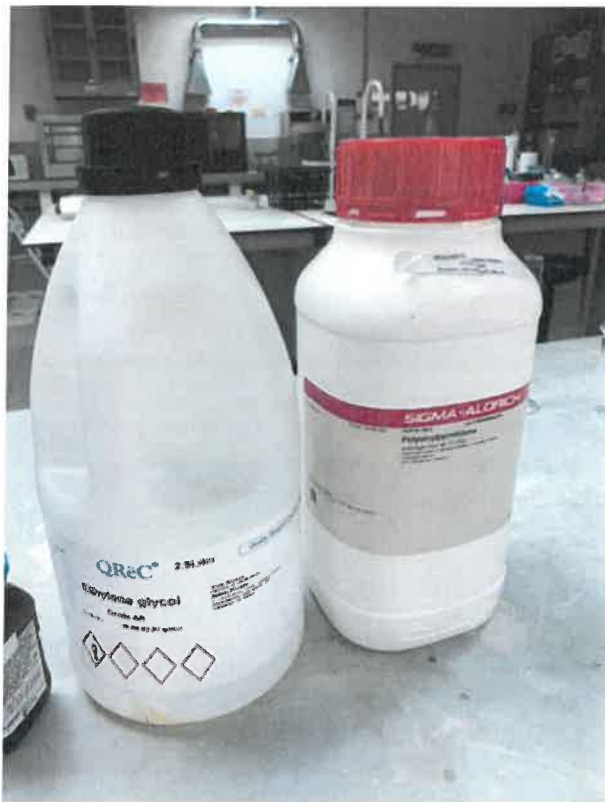


Figure 5. Materials: Ethylene Glycol, Polyvinylpyrrolidone, Silver Nitrate and Copper (II)



Figure 6. Measuring Polyvinylpyrrolidone, Copper (II) Acetate and Silver Nitrate using analytical balance



Figure 7. Measuring Ethylene Glycol solution using beaker and measuring cylinder

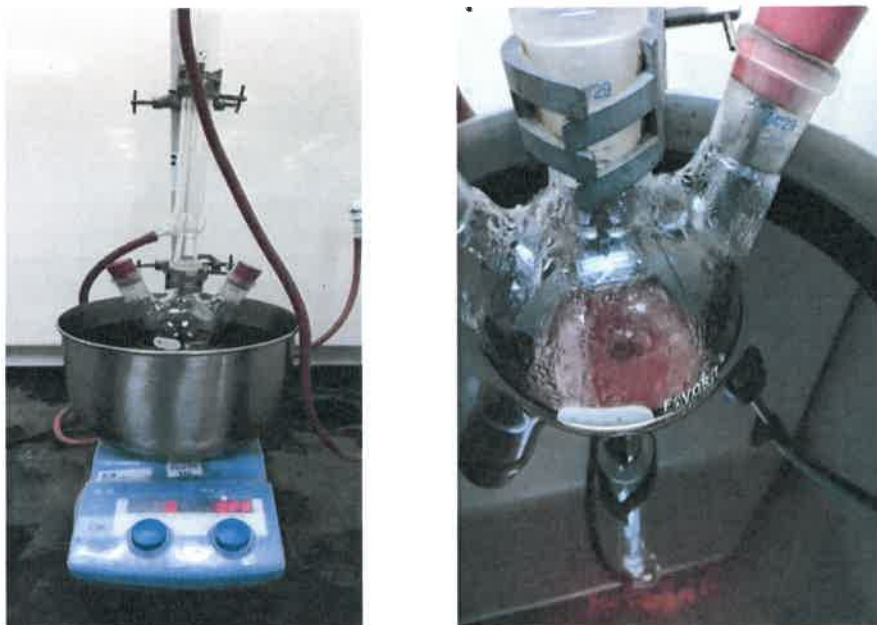


Figure 8. Reagent in heating three-neck flask with continuous stirring using magnetic stirrer and continuous flow of bubbling nitrogen





Figure 9. Cooling the reagent with water bath (Digital Ultrasonic Cleaner)

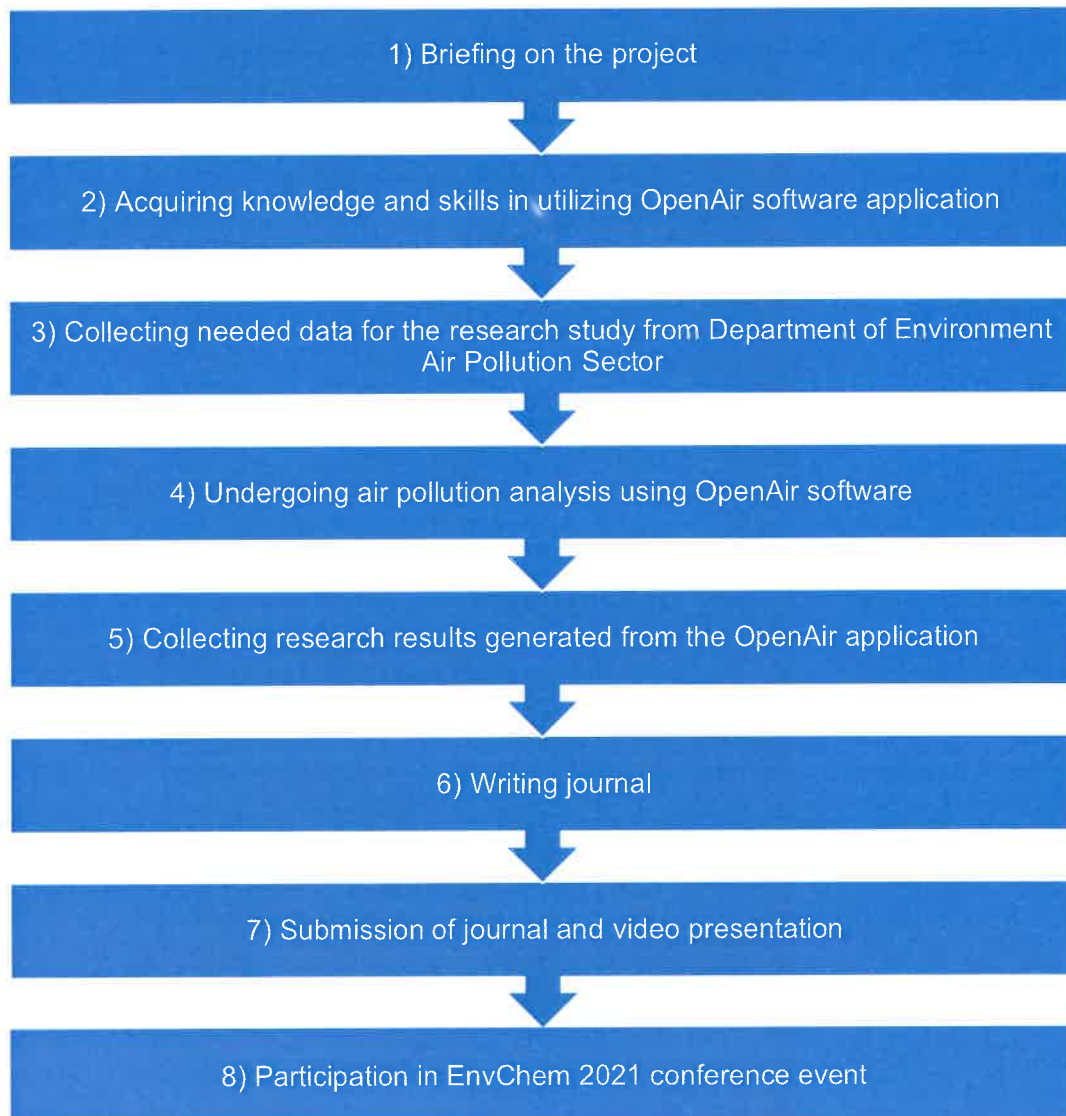


Figure 10. Centrifuge the reagent

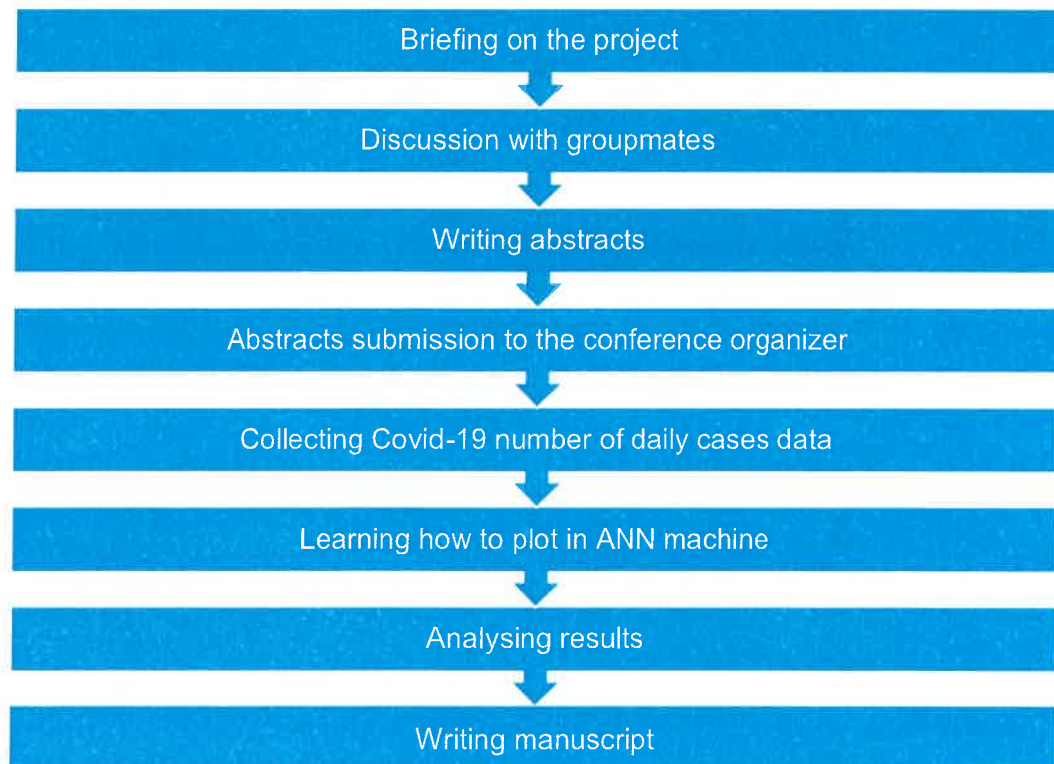


Figure 11. Removing excess unwanted liquid from the nanoparticles formed

3.0.2 Process Flow of Air Quality Assessment Using OpenAir in Seberang Jaya, Penang During Movement Control Operation (MCO)



3.0.3 Process Flow of The Relationship of Air Pollution and Covid-19 Related Cases/Deaths: A Case Study in Klang Valley, Malaysia



3.1 Brief daily/weekly activity

Week 1

On the first day, I met up with Supervisor, Ts. Mohamed Syazwan Bin Osman for a briefing on the company's background, job scopes as well as on the rules and regulations that must be followed. Getting a quick touring around the workplace to familiarize with the working environment. Getting to know some of the working colleagues and introducing myself to them.



Figure 12. Department of Chemical Engineering working environment in UiTM Pulau Pinang

Next, there was a briefing on our first mini project which is entitled “Air Quality Assessment Using OpenAir in Seberang Jaya During Movement Control Order (MCO)”. Thousands of lists of data are given for me to rearrange and separate them in following certain categories such as for each state and district throughout Malaysia. The data contain the concentration of all six main pollutants namely PM10, PM2.5, CO, NO2, SO2, and O₃ during Movement Control Order (MCO) from the start of MCO which are from 18th of March 2020 to 31st of May 2020 by hourly each day. Not to mention, I was assigned to write formal letters to the Department of Environment in requesting the wind speed and wind direction data as well as communicating with them into convincing for the demanded data as there are certain regulations that must be followed to acquire these data.

The screenshot shows a Microsoft Excel spreadsheet with a dark theme. The title bar indicates the file name is 'Nabila Afiqah_UITM'. The ribbon includes 'Home', 'Insert', 'Draw', 'Page Layout', 'Formulas', 'Data', 'Review', 'View', and 'Tell me'. The status bar at the bottom shows 'Ready' and '75%' zoom.

STAF/NO ID	USP/Posisi	BAFTA/NoID	PKB, (RM) (Agenda)	SD, RM (Beras)	RM, RM (Beras)	SL, RM (Beras)	CS, RM (Beras)
1	Bank Public, Public (Mentor)	05/03/2020 11:00:00 AM	21,920	0.0000	0.0000	0.0000	0.0000
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50	Bank Public, Public (Mentor)	05/03/2020 11:00:00 AM	21,920	0.0000	0.0000	0.0000	0.0000

Figure 13. Thousands of list of data must be rearranged and separated according to the wanted categories

Li Liyana Othman,
Seksyen Data,
Bahagian Udara,
Jabatan Alam Sekitar,
Ara 1-4, Podium 2 & 3, Wisma Sumber Asli No.25,
Persiaran Perdana, Presint 4,
62574 Putrajaya, Malaysia.

Surat Kami : 100-UITMPP(FKK.30/2)

Tarikh : 21 Mac 2021

السلام عليكم ورحمة الله وبركاته

Puan,

MEMOHON DATA UNTUK TUJUAN PENYELIDIKAN AKADEMIK

Dengan segala hormatnya perkara di atas dirujuk.

2. Sukacita dimaklumkan bahawa Fakulti Kejuruteraan Kimia UITM Cawangan Pulau Pinang sedang menjalankan penyelidikan yang bertajuk "Air quality modelling assessment using openAir" yang dijalankan oleh pelajar menemani sesi latihan industri, saya iaitu Tengku Shamim Amelin Tengku Zahidi.

3. Sehubungan itu, besarlah harapan kami untuk memohon pertimbangan dan kerjasama pihak Puan untuk membekal data-data terutamanya kelajuan and arah angin yang dioerap oleh pihak Puan untuk sebagai asas pembinaan model ini. Dilampirkan perincian data diperlukan pihak kami.

4. Untuk maklumat lanjut bolehlah menghubungi saya di talian 0132022645 atau emel syazwan.osman@uitm.edu.my. Segala kerjasama diberikan pihak Puan amatlah kami hargai dan didahului dengan jutaan terima kasih.

و السلام,

Yang benar,



Ts. Mohamed Syazwan Osman
Pensyarah Kanan
Fakulti Kejuruteraan Kimia
UITM Cawangan Pulau Pinang

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Pulau Pinang, MALAYSIA
Tel: +604-382 2888
Fax: +604-382 2776



LAMPIRAN

Data-data yang diperlukan

1) lokasi:

Negeri	Kawasan
Perlis	- Kangar
Kedah	- Sungai Petani - Alor Setar - Kulim Hi-Tech - Langkawi - Sungai Petani
Penang	- Balik Pulau - Minden - Seberang Jaya - Seberang Perai
Perak	- Pegoh Ipoh - Seri Manjung - Taiping - Tanjung Malim - Tasek Ipoh
Selangor	- Banting - Klang - Kuala Selangor - Petaling Jaya - Shah Alam
Negeri Sembilan	- Nilai - Port Dickson - Seremban
Melaka	- Alor Gajah - Bandaraya Melaka - Bukit Rambai
Johor	- Batu Pahat - Kluang - Kota Tinggi - Larkin - Pasir Gudang - Pengerang - Segamat - Tangkak
Pahang	- Balok Baru Kuantan - Indera Mahkota Kuantan - Jerantut - Rompin - Temerloh
Terengganu	- Besut - Kemaman - Kuala Terengganu - Paka
Kelantan	- Kota Bharu - Tanah Merah
Sabah	- Keningau - Kimanis - Kota Kinabalu - Sandakan - Tawau
Sarawak	- Bintulu - ILP Miri - Kapit - Kuching - Limbang

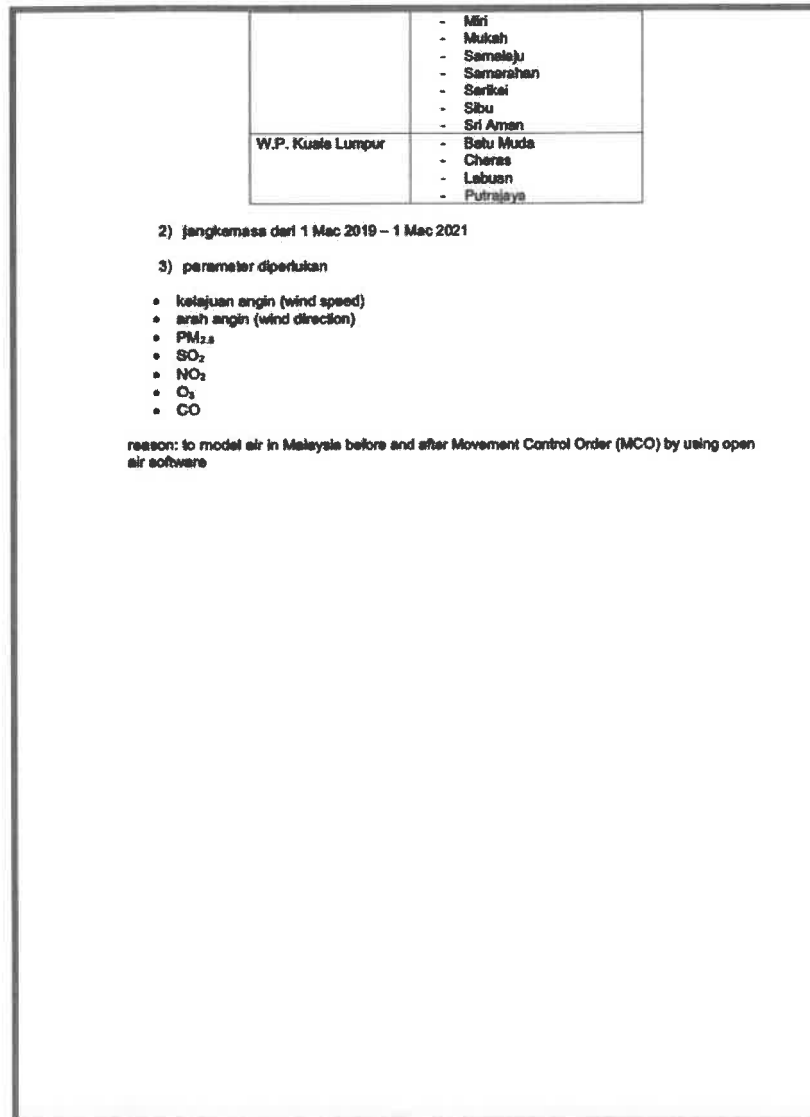


Figure 14. Formal letter to DOE in requesting needed data

My supervisor assigned Miss Khairunnisa Khairudin as my instructor to teach me how to use the OpenAir software for this first mini project. For certain days, I was trained to use OpenAir and learn to produce statistical figures by just using coding. Later on, I started to undergo tutorial OpenAir 2021 Part A with Miss Khairunnisa Khairudin.

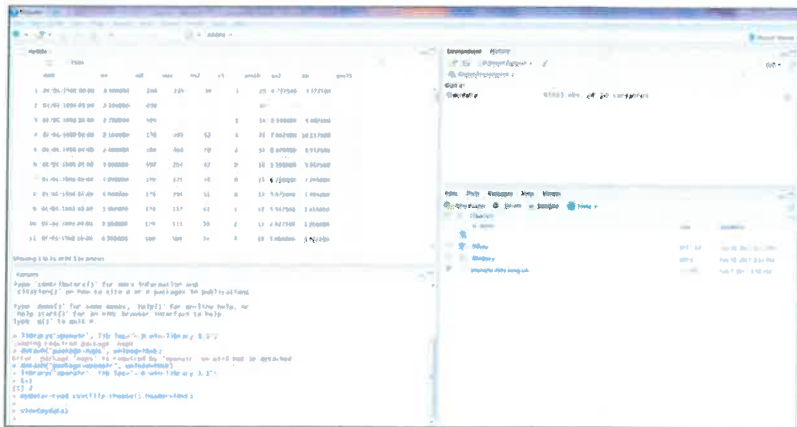


Figure 15. OpenAir Software application

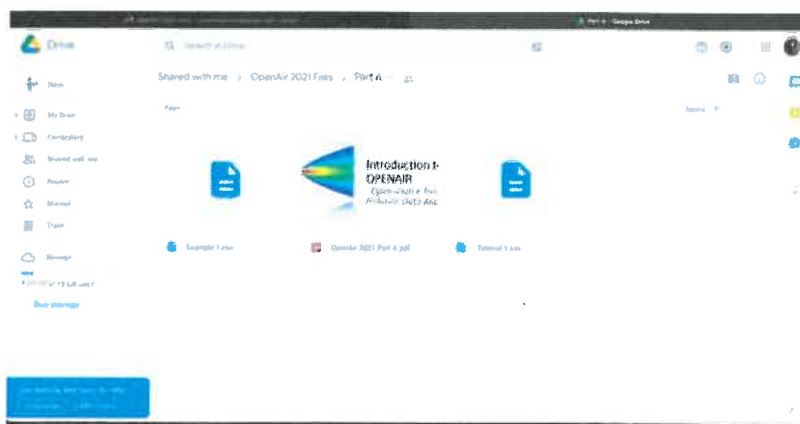


Figure 16. Tutorial OpenAir 2021 Part A

Week 2

On the second week, I received a reply from the DOE of my demanded research proposal prior handing over the needed data. Then, I have been instructed to write a short research proposal for DOE team. Before starting to write, I was asked to learn the format of research proposal from Miss Khairunissa Khairudin. Throughout this week, I spent most of my time writing and researching on literature online such as related journals and articles that can help with my research proposal writings.



FACULTY OF CHEMICAL ENGINEERING

SUBJECT:

RESEARCH PROPOSAL

TITLE:

AIR QUALITY MODELLING ASSESSMENT USING openAir IN MALAYSIA BEFORE
AND AFTER COVID-19 PANDEMIC

Date submitted:

31/03/2021

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1.0 Title of the study

Air quality modelling assessment using openAir in Malaysia before and after COVID-19 pandemic

2.0 Background of study

Air pollution problem in Malaysia has become increasingly more serious over these past few years resulted in the modernization growth which includes the emission of pollutants from motor vehicles, power plant, industrial, and more.[1] Not to mentioned, Malaysia has been greatly affected with haze problem from Indonesia with their slash and burn practice especially by farmers that gradually blown and entering Malaysia's territory by the wind from Indonesia.[2] Due to increasingly high amounts of air pollution problem in Malaysia, it is decided to analyze deeper onto the level of air pollution in different area or parts of Malaysia as well as determining the source of all the existing pollutants whether it may be from industrial parts of the specific area or elsewhere. The investigation will be undergo completely using openAir software to investigate its' reliability in analyzing air pollutions levels with the use of data obtained from Department of Environment (DOE).

3.0 Problem statement

Due to recent global threat COVID-19, World Health Organization (WHO) announced Public Health Emergency of International Concern (PHEIC). COVID-19 pandemic has been spreading throughout the world that was originally from Wuhan, Hubei Province, People's Republic of China in late 2019. Malaysia was first affected with COVID-19 cases on 25th January 2020 and the cases eventually increases throughout Malaysia. As the cases increases in alarming pace, it urges the Malaysian government to take several measures to control the cases and eventually planning on stopping it from spreading. One of the major steps taken by the government members is the implementation of Movement Control Order (MCO). Its' main objective is to terminate the source of COVID-19 outspread which leading the reduction of cases all around Malaysia. As MCO in operational period, the amount of citizens activities outside home has drastically reduced as a consequence of several rules implemented such as solely only allowing essential business to

2

operate, several industries must be suspended which substantially minimize traffic density and the release of industrial pollutants.[3] A more detailed analysis of a new level of air pollution throughout certain area in Malaysia using openAir software has yet to be known. There are 6 criteria pollutants based on Air Pollution Index (API) that will be evaluated namely, carbon monoxide, ground-level ozone, PM_{10} , $PM_{2.5}$, nitrogen oxides, and sulfur dioxide.

4.0 Objectives of the study

- Studying the effects of Movement Control Order (MCO) towards the amount of air pollution released into the environment
- Analyzing air pollution into a deeper level with variety of input from openAir data itself

5.0 Literature review

5.1 Air pollution

Air pollution is known to be one of the worst environmental problems faced throughout the whole world that started in the twenty-first century that are ongoing since then. Air pollution problem would result in a major health concerns that is alarming leading to global threat to human health and welfare. Most popular diseases caused by polluted air are known to be cardiovascular disease (CVD). In fact, it is the leading cause of deaths worldwide as it is estimated that 17.9 million die from CVD every year contributed to 31% of all deaths involved. Unfortunately for the case in Malaysia, similarly CVD is also the leading cause of death with a much higher rate which are 35% of total deaths. The drive for studying air pollution is its' significant impact towards human health that eventually will affect the value of health burden entirely. With the rapid economic growth, industrialization and haze episodes combined has degraded our air quality.[4]

5.2 Carbon monoxide

CO is a colorless, odorless gas which can be harmful if inhaled in large amounts. Outdoor CO comes from vehicles and machinery that burn fossil fuels which are then releases it into the surrounding air. The higher the concentration of CO inhaled the lower the concentration of oxygen in the blood stream. Eventually, high level of CO consumption can cause dizziness, confusion, unconsciousness and even death. High level of CO is not likely to occur outdoor, however people with heart diseases are more vulnerable. Even for a short-term exposure to high CO would lead to insufficient oxygen in the heart and chest pain known as angina.[5]

5.3 Ground-level ozone

The existence of ground-level ozone is formed by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC). The emission of pollutants from many sources from human activities reacts with the presence of sunlight will form the ozone. Generally, the consumption of ozone in the air could harm the human health and well-beings. People with asthma, children, old age, active outdoors, low intake nutrients are most vulnerable to the exposure. Not to mentioned, high exposure of ozone could harm vegetation especially in growing season and even ecosystems.[6]

5.4 Particulate matter (PM₁₀ and PM_{2.5})

PM refers to mixtures of solid particles with different sizes and shapes such as dust, dirt, soot and more. It comes from construction sites, unpaved roads, fields, smokestacks or fires. PM₁₀ is particles with 10 micrometer or smaller in size and PM_{2.5} is particles with 2.5 micrometer or smaller. These particles are small enough to be inhaled and pose a great risk of health concerns as it may enters deep into lungs and even into bloodstreams. Towards the environment, PM could take part in the development of reduced visibility (haze).[7]

5.5 Nitrogen oxides

The most reactive gases from group nitrogen oxides (NOx) would include nitrogen dioxide, nitrous acid and nitric acid. These pollutants produce from the burning of fossil fuels emitted by vehicles, power plants and off-road equipment. The inhalation of high level of nitrogen oxides will bothers the respiratory system. Short period of exposure could activate respiratory diseases while a longer period of exposure could lead to respiratory infections. Nitrogen oxides causes acid rain, haze as well as nutrient pollution in the effected surrounding environment.[8]

5.6 Sulfur dioxide

The combustion of fossil fuels in power plant and other industrial facilities is the main source of the production of this pollutant. Other small sources would include, extracting metal from ores, natural sources, emission of vehicles and more. Exposure to it may lead to respiratory irritations, breathing difficulties and contributing to PM pollution. Exposure to trees and plants could destroy foliage and disturb growth.[9]

6.0 Methodology

The analysis of air pollution will proceed with the use of openAir software by keep in thousands of data obtained. The data must contain date and time from 1st March 2019 until 1st March 2021 and a total of 6 types of pollutants listed namely carbon monoxide, ground-level ozone, PM_{2.5}, PM₁₀, nitrogen oxides and sulfur dioxide that are presented in excel format. The area chosen for this specific research would include Perlis (Kangar), Kedah (Sungai petani, Alor setar, Kulim Hi-tech, Langkawi), Penang (Balik pulau, Minden, Seberang jaya, Seberang perai), Perak (Pegoh ipoh, Seri minjung, Taiping, Tanjung Malin, Tasek ipoh), Selangor (Banting, Klang, Kuala Selangor, Penang jaya, Shah alam), Negeri Sembilan (Nilai, Port Dickson, Seremban), Melaka (Alor gajah, Bandaraya Melaka, Bukit rambai), Johor (Batu pahat, Kulang, Kota tinggi, Larkin, Pasir Gudang, Pengarang, Segamat, Tangkak), Pahang (Balok baru Kuantan, Indera mahkota Kuantan, Jerantut, Rompin, Temerloh), Terengganu (Besut, Kemaman, Kuala Terengganu, Paka), Kelantan (Kota

bahru, Tanah merah), Sabah (Keningau, Kinamas, Kota Kinabalu, Sandakan, Tawau), Sarawak (Bintulu, R.P miri, Kapit, Kuching, Llabang, Miri, Mukah, Sernajaju, Samarahan, Sarikei, Sibu, Sri aman), and W.P. Kuala Lumpur (Batu mada, Cheras, Labuan, Putrajaya).

openAir software works by attaching the required data and typing specific coding in 'R' console to analyze desired information. Air quality monitoring data in the software can be in the form of windflow plots, pollution rose, taylor diagram, bivariate polar plots, trend analysis, model evaluation, statistical parameters (min value, max value, median, quartiles), graphical output (histogram, density plot), period distribution, summary plot, calendar plot as well as percentile plot.

7.0 Expected significant contribution to new knowledge/stakeholders.

Expected outcome from this research is being able to successfully analyses in detail of the state of air throughout Malaysia and determining which area of a land that emits the most pollutants in the surrounding air. Not to mentioned, a new knowledge acquired while undergoing simulation of the software to determine ways for a better optimal operation by trial and error in coding and finding out if certain form of analysis provided is applicable with the data obtained from Department of Environment Malaysia (DOE).

The openAir software is a set of recorded air quality (concentration) data and typically recorded using a Continuous emission monitoring system (CEMS). openAir main purpose is to analyze air pollution data that uses statistical software "R" in the form of package in a computer programming language. This research will identify the level of effectiveness in the analysis of air pollution through certain commands that is given.

8.0 References

- [1] Department of Statistics Malaysia. (2018). Compendium Of Environment Statistics, Malaysia 2018. *Department of Statistics Malaysia, June*, 5-9.
- [2] Department of Environment. (2013). Air Pollution In Malaysia. *Ministry of Natural Resources and Environment*. 1-10. [http://apims.doc.gov.my/apims/General Info of Air Pollution Index.pdf](http://apims.doc.gov.my/apims/General%20Info%20of%20Air%20Pollution%20Index.pdf)

- [3] Abdullah, S., Ismail, M., Ahmed, A. N., & Abdullah, A. M. (2019). Forecasting particulate matter concentration using linear and non-linear approaches for air quality decision support. *Atmosphere*, 10(11), 20894. <https://doi.org/10.3390/atmos10110667>
- [4] Usmani, R. S. A., Saeed, A., Abdullahi, A. M., Pillai, T. R., Bhanji, N. Z., & Hashem, I. A. T. (2020). Air pollution and its health impacts in Malaysia: a review. *Air Quality, Atmosphere and Health*, 13(9), 1093–1118. <https://doi.org/10.1007/s11869-020-00867-x>
- [5] US EPA, O. (2016). Basic Information about Carbon Monoxide (CO) Outdoor Air Pollution. *U.S. Environmental Protection Agency*, 2016. <https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution>
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- [7] Agency, U. S. E. P. (n.d.). Particulate Matter (PM) Pollution Particulate Matter (PM) Basics What is Being Done to Reduce Particles. *Particulate Matter (PM) Pollution*.
- [8] US EPA, O. (2017). Basic Information about NO2. *Environmental Science and Pollution Research*, 24(3), 2781–2789. <https://www.epa.gov/no2-pollution/basic-information-about-no2>
- [9] EPA. (2019). Sulfur Dioxide Basics. *Corrosion*, 1. <https://www.epa.gov/s02-pollution/sulfur-dioxide-basics#effects>

7

Figure 17. Research proposal for DOE's team

I was also instructed to go through a couple of examples and tutorial questions from the tutorial OpenAir 2021 Part A alone to see if I remember what I have learnt. The aim of this tutorial was to be able to produce four different types of statistical figures that I have recently learned the coding from the data given in the tutorial. Certain settings in the application that I must try and error, so that the system can read the data and generate wanted statistical figures.

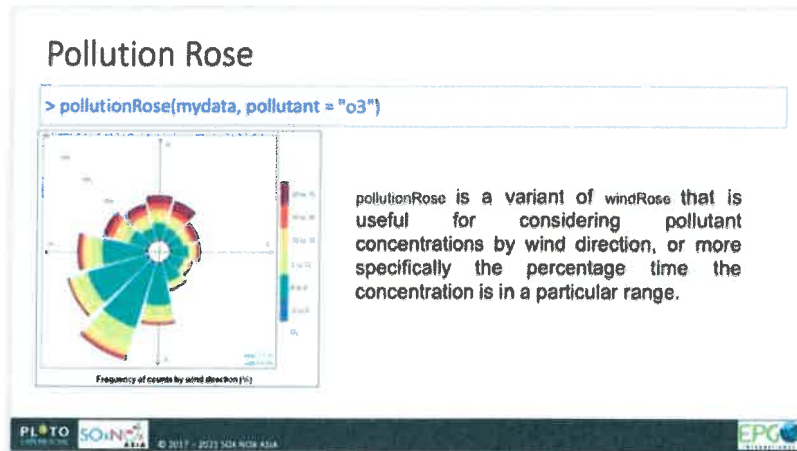


Figure 18. Four types of statistical figure learned namely wind rose, summary plot, histogram and pollution rose

Week 3


Received an email of handling over the requested data and the team requested to fill in the form of acceptance of data given by them. I was then instructed to fill out the form and write a thank you formal letter to the DOE team.

Week 3 is fully working towards rearranging thousands of data given to me. Furthermore, I was then ordered to transfer the data of air pollution, namely PM10, PM2.5, CO, NO2, SO2, O3, wind speed as well as wind direction into the OpenAir software application and making some changes on its date format and units so that the data can be read by the software.

BORANG PENGESAHAN PENERIMAAN DATA KUALITI UDARA
BAHAGIAN UDARA, JABATAN ALAM SEKITAR

Bil.	Perkara	Nyatakan
1	Nama Pemohon	Tenoku Shamim Amelin Binti Tenoku Zahidi
2	Nama & Alamat Pusat Pengajian	Tenoku Shamim Amelin Binti Tenoku Zahidi UiTM Cawangan Pulau Pinang, Kemuning Tok Ebat, 14000 Bukit Mertajam, Perangin
3	E-mel & No. Telefon Bimbit	shamimamelin@gmail.com +60165443996
4	Nama & Jawatan Penyelidik	Ts. Mohamed Syazwan Osman Pensyarah Kanan UiTM Kampus Pulau Pinang
5	Tujuan Data Dimohon	Mengkaji kesan Perintah Kawalan Pergerakan (MCO) terhadap jumlah pencemaran udara yang dilepaskan ke persekitaran dan menjalankan analisis pencemaran udara ke tahap yang lebih mendalam dengan pelbagai input dari data openAir isu sendiri.
6	Tajuk Kajian	Penilaian pemodelan kualiti udara menggunakan openAir software.
7	Jangkaan Tarikh Kajian Siap	8 April 2021 – 15 Julai 2021
8	Tempoh Data Dimohon	21 Mac 2021
9	Lokasi Stesen	UiTM Kampus Pulau Pinang, Bekalan Jabatan Pabuk Kelengkapan Kiri
10	Kekerapan Data	Parameter Dimohon 1. Kelajuan angin (wind speed) 2. Arah angin (wind direction) 3. PM _{2.5} 4. SO ₂ 5. NO ₂ 6. O ₃ 7. CO 8. PM ₁₀
11	Penerimaan Data (andaikan ✓)	<input checked="" type="checkbox"/> Melalui E-mel Bertajuk 5 April 2021 dan 8 April 2021 <input type="checkbox"/> Dengan Tajaan

Pengesahan Penerimaan Data:



Tandatangan :
Nama : Teonku Shamim Amelin Binti Teonku Zabidi
No. K/P : nonans-03-0010
Tarikh : 08.04.2021

Peringatan:
Satu salinan hardcopy/CD laporan hasil kajian hendaklah dikemukakan ke Jabatan ini dalam tempoh satu (1) bulan dari tarikh kajian siap.

Figure 19. Filled form of data acceptance from DOE

Week 4 – Week 5

Throughout these weeks, there has been some problem regarding the access in entering UiTM Pulau Pinang property due to movement restriction because of Covid-19. I must meet up with rector UiTM Pulau Pinang to ask permission and undergoing agreements to enter UiTM property as well as writing formal letters. A lot of arrangements and preparation with my supervisors in creating a timetable as to when I can enter and cannot enter the UiTM property.

Apart from it, I was instructed to finishing learning and reading slides part B for teaching me how to use OpenAir software with Miss Khairunnisa Khairudin and undergoing tutorial and examples for OpenAir 2021-part B. For the most part, I have learnt how to generate new statistical figure namely percentile plot, polar plot, and calendar plot. I also learnt how to change colors in the statistical figures.

Shaira Ismail
No. 12, Jalan Pauh Jaya 4/2
Taman Pauh Jaya
11700 Pauh
PULAU PINANG

3hb. April 2021

YBhg. Prof. Dr. Salmiah Kasolang @ Kasolang
Rektor
Universiti Teknologi MARA
Kampus Permatang Pauh
UITM Cawangan Pulau Pinang
PULAU PINANG

Dibekalkan
12 APR 2021
PROFESOR DR. SALIMAH KASOLANG
REKTOR
UNIVERSITI TEKNOLOGI MARA
KAMPUS PERMATANG PAUH
11700 PERMATANG PAUH
PULAU PINANG

YBhg. Puan Rektor

PENEMPATAN LATIHAN INDUSTRI PELAJAR

NAMA PELAJAR : TENGKU SHAMIM AMELIN TENGKU ZAHEDI
PROGRAM : DIPLOMA KEJURUTERAAN KIMIA, KAMPUS PASIR
GUDANG, UITM CAWANGAN JOHORE
NO. MATRIK : 2018421940

Saya ingin merujuk kepada surat saya bertarikh 30hb. Mac 2021 berkenaan dengan perkara di atas.

Saya dengan segala hormatnya memohon agar anak saya dibenarkan menghadirkan diri untuk menjalani latihan praktikal dengan meminimalkan pergerakan keluar masuk beliau ke kampus dengan "single-entry single-exit per day". Pada masa yang sama saya akan pastikan beliau beliau senantiasa mematuhi SOP ketika berada di dalam kampus. Peraturan ini terpakai kepada para pelajar UITM secara amnya berdasarkan kepada "FAQs Admission to Campus - MARCH - AUGUST 2021" yang dikeluarkan oleh "Office of the Deputy Vice Chancellor (Academic and International)".

Dengan ini saya memohon pertimbangan serta budibicara pihak YBhg. Puan Rektor yang sewajarnya terhadap permohonan ini demi memastikan perlakuan yang adil dan saksama kepada semua. Saya juga bagi memberi peluang kepada anak saya agar dapat menjalani latihan praktikal dengan sempurna dan teratur di dalam tempoh yang ditetapkan.

Sekian, terima kasih dan salam hormat daripada saya.

Yang Benar
Shaira Ismail
UITM Pulau Pinang

LAMPIRAN 1

CADANGAN KEMASUKAN PELAJAR

Tengku Shattika Amelin Binti Tengku Zahidi

Cadangan pertama

Berita	Selasa	Rabu	Khamis	Jumaat
WFO	WFH	WFH	WFH	WFO

Cadangan Kedua

Berita	Selasa	Rabu	Khamis	Jumaat
WFO	WFH	WFO	WFH	WFO

Projek yang akan dilaksanakan pelajar

- 1) Simulasi kualiti pencemaran udara menggunakan software OpenAir sebelum dan selepas PEP semasa pandemic covid-19
- 2) Synthesis and characterization of bimetallic nanoparticles as filter layer for reusable mask (Kashir Kirana Sdn Bhd) – lab work
- 3) Formulation of active ingredient for cosmetic (FLSuhaz Sdn Bhd) lab-work

Pengesahan



Mohamed Syazwan Bin Osman, P.Tech
Senior Lecturer
Faculty of Chemical Engineering
Universiti Teknologi MARA,
Cawangan Pulau Pinang

7 April 2021



Cawangan Pulau Pinang
Kampus Permatang Pauh

Surat Kami : 100-UITMPP(PJIM&A.14/3/4)
Tarikh : 08 Mac 2021

Koordinator Latihan Industri
Fakulti Kejuruteraan Kimia
Universiti Teknologi MARA Johor
Kampus Pasir Gudang
81750 Masai, Johor

(WP: ENCIK MOHD HAKAL MUSTAFA)

Tuan

PENEMPATAN LATIHAN INDUSTRI PELAJAR

Dengan segala hormatnya perkara di atas diujuk.

2. Bukacita dimaklumkan bahawa Bahagian Penyelidikan, Jaringan Industri, Masyarakat & Alumni, Universiti Teknologi MARA Cawangan Pulau Pinang bersetuju untuk menerima pelajar berikut untuk menjalani latihan industri bermula pada **21 Mac 2021** sehingga **15 Julai 2021**.

No.	Nama Pelajar	Kejuruteraan	Alamat & No. Tel	NO. Matrik
1.	Tengku Shamim Amelin binti Tengku Zahidi	Diploma Kejuruteraan Kimia	No. 12, Lrg Pauh Jaya 4/2, Tmn Pauh Jaya, 13700 Perai, Pulau Pinang / 016-5443896	2018421944

3. Untuk makluman tuan pelajar tersebut akan ditempatkan di organisasi berikut:

Fakulti Kejuruteraan Kimia
Universiti Teknologi MARA Cawangan Pulau Pinang
Kampus Permatang Pauh, 13500 Pulau Pinang

(WP: Ta. MOHAMED SYAZWAN OSMAN)

4. Sekiranya terdapat sebarang pertanyaan berhubung perkara di atas, pihak tuan boleh menghubungi kami di talian 04-3822912.

Sekian, terima kasih.

"PRIHATIN RAKYAT: DARURAT MEMERANGI COVID-19"

"BERKHIDMAT UNTUK NEGARA"

Yang benar


PROF. MADYA DR. NOR AZIYAH BAKHARI
Timbalan Rektor

Bahagian Penyelidikan, Jaringan Industri,
Masyarakat & Alumni
Tel : 04-3822912
Faks : 04-3822911

Universiti Teknologi MARA
Cawangan Pulau Pinang
Kampus Permatang Pauh
13500 Permatang Pauh
Pulau Pinang, MALAYSIA
Tel : +604-382 2888
Fax : +604-382 2776



FKK/CHE353/L1



FAKULTI KEJURUTERAAN KIMIA
DIPLOMA KEJURUTERAAN KIMIA

INDUSTRIAL TRAINING PLACEMENT FORM

Our Ref: 100-UTMPG (FKK.14/3/4)

Industrial Training Coordinator
Faculty of Chemical Engineering
Universiti Teknologi MARA Johor
Pasar Gudang Campus
81750 Masai, Johor.
(attn.: Mr Haikal Mustafa)


Contact no : 07-381 8545 (O), 07-381 8141 (F)
Email : haikal4252@uitm.edu.my

We hereby **AGREE / DISAGREE** to accept your student to undergo the industrial training in our company within the period of 31 MARCH 2021 until 15 JULY 2021.
The particulars of the arrangement are as following:

Student name	TENGGU SHAHM AMELIN BINTI TENGGU ZAHDI
Company name	UNIVERSITI TEKNOLOGI MARA CAWANGAN PULAU PINANG
Company address	KAMPUS PERMATANG PAUH 13500 PERMATANG PAUH PULAU PINANG
Supervisor name	TS. MOHAMED SYAIJIDAN OSMAN
Department	FAKULTI KEJURUTERAAN KIMIA
Monthly allowance (if any)	NIL
Remarks (if any)	-

Thank you.

Yours faithfully



Name: Prof. Madya Dr. Nor Azryen Bakhan
Position: Timbalan Rektor
Penyediaan & Jalinan Industri
Universiti Teknologi MARA (UiTM)
Cawangan Pulau Pinang
13500 Permatang Pauh

Figure 20. Formal letter asking permission to enter UiTM Pulau Pinang property to undergo internship training

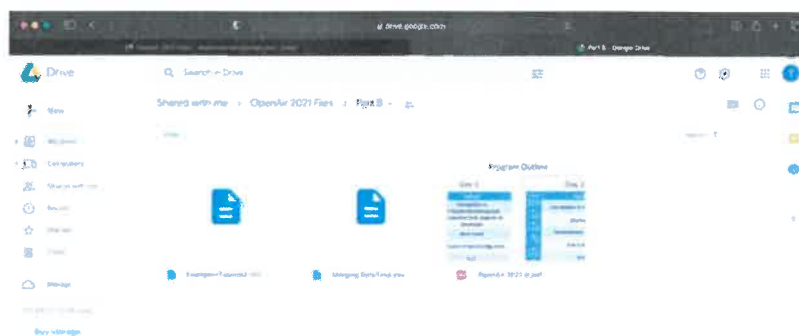


Figure 21. Slides for OpenAir part B and tutorial and example of the OpenAir 2021 B

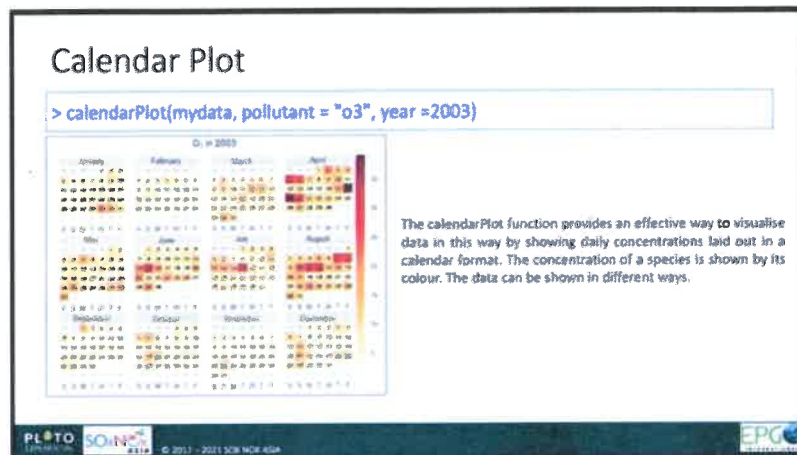
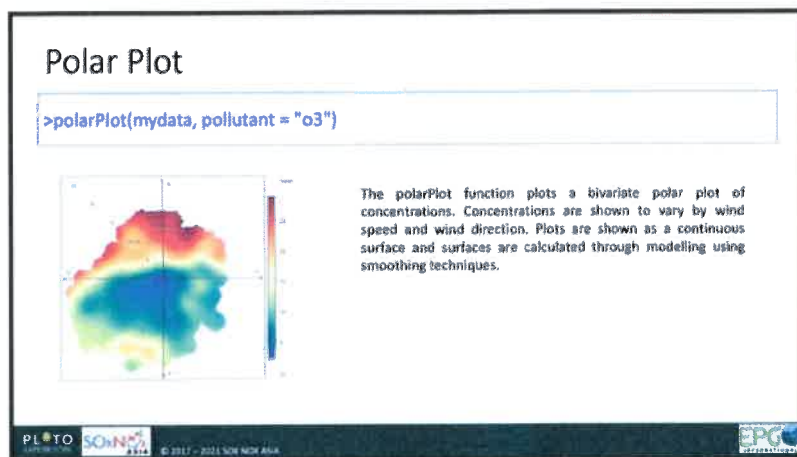
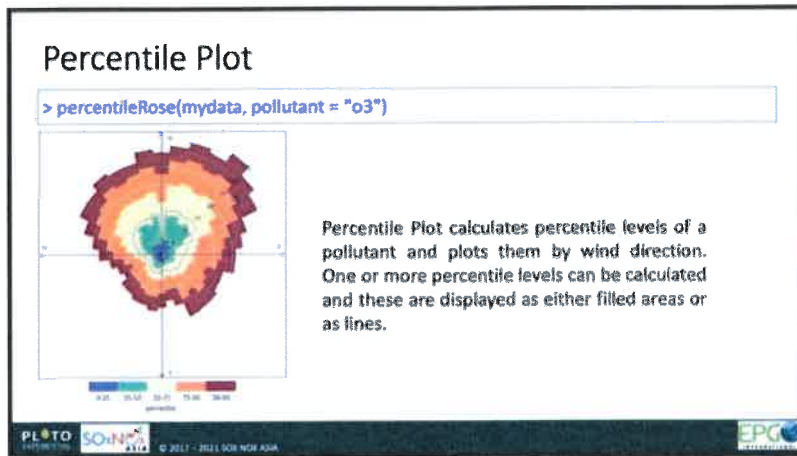


Figure 22. Three types of statistical figure learned, namely percentile plot, polar plot, and calendar plot

Week 6 – Week 9

For about four weeks of my internship duration, I have fully spent my working time on this first project. I was instructed to start analyzing the air pollution data using the OpenAir software and generate only four wanted statistical figures namely rose plot, pollution rose, bivariate polar plot and calendar plot.

After further observations and analyzing the generated statistical figures, I started in writing the journal for this project. Continuous drafts and discussions are done in making sure I am doing the right thing as it is extremely difficult as well as taking a lot of time. For this research, I must undergo compiling of lists of journals and articles related to the project done for literature information to be added in the manuscripts. Not to mention, I must undergo research on how to explain each statistical figure gained so that I understand which information is needed and which is not needed to be added in the manuscript.

As the writing of the manuscript is completed, I have to join a discussion with Miss Khairunissa Khairudin as well as my supervisor, Sir Syazwan on the briefing of the new project which is the production of nanoparticles for the use of face masks and the interrelation of PM_{10} and $PM_{2.5}$ and Covid-19 outbreaks.

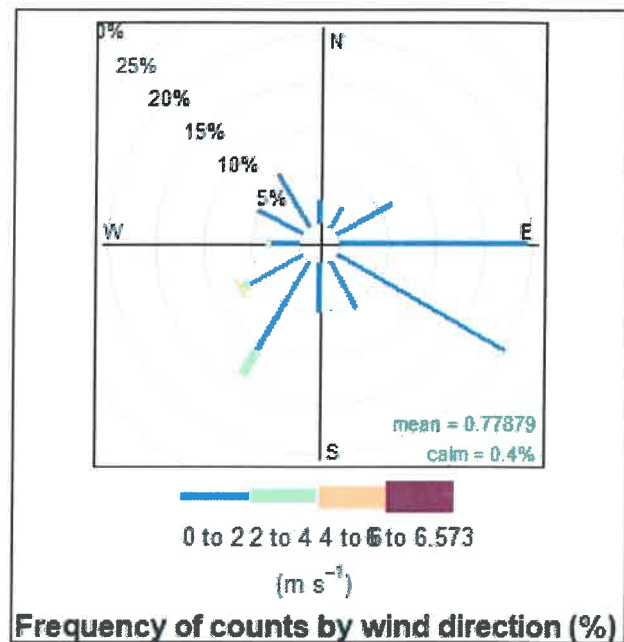


Figure 23. Wind rose plot of Seberang Jaya area

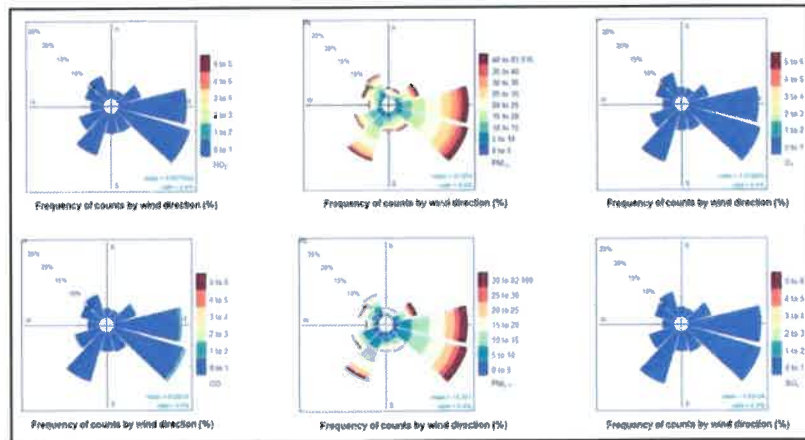


Figure 24. Pollution rose for NO₂, PM₁₀, O₃, CO, PM_{2.5}, and SO₂

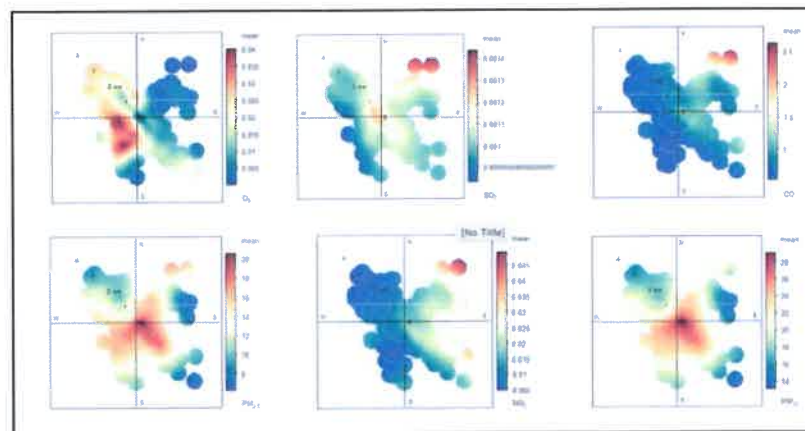


Figure 25. Bivariate polar plot for NO₂, PM₁₀, O₃, CO, PM_{2.5}, and SO₂

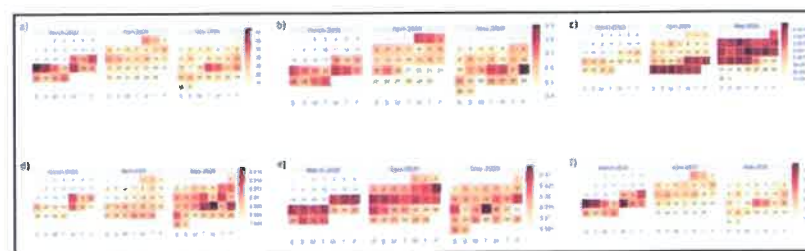


Figure 26. (a) Calendar plot of PM₁₀ (b) Calendar plot of CO (c) Calendar plot of SO₂ (d) Calendar plot of NO₂ (e) Calendar plot of O₃ (f) Calendar plot of PM_{2.5}

Week 10 – Week 14

During this duration of my internship, is the start of my routine of working two projects at the same time. I was instructed to undergo lab sessions with the two of degree students for the project called synthesis of nanoparticles from silver nitrate and copper (II) acetate for face mask. During the lab sessions we must undergo a couple of methods and retrying the process of the production of nanoparticles until we have gained ideal results. We must go through numerous

times for the online searching of the new methods and gather the right journals from the right resources. We must explore a method that doesn't consist of hexane materials as it is harmful to human health in its own ways if inhale excessively.

As I am working on the nanoparticles project to produce face mask, I was instructed to also work on our third project entitled 'The Relationship of Air Pollution and Covid-19 Related Cases/Deaths: A Case study in Klang Valley, Malaysia'. For my part of this research, I was given a task to write an abstract of this research to be submitted to the ICGSCE 2021 conference organizer. I was also assigned to collect Covid-19 cases throughout Putrajaya and Sepang area from the 22nd February 2021 to 31st May 2021. However, I had to redo the Covid-19 data couple of times due to miscommunication among the group mates which has resulted in taking a long time to get the right date for Covid- 19 daily cases data.



Figure 27. 1st method making nanoparticles where no reaction occurred



Figure 28. 2nd method making nanoparticles where agglomeration took place



Figure 29. 3rd method making nanoparticles where it is successful

THE RELATIONSHIP BETWEEN AIR POLLUTION AND COVID-19 RELATED CASES/DEATHS: A CASE STUDY IN KLANG VALLEY, MALAYSIA

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Abstract: Mitigation measures and control strategies relating to novel coronavirus disease 2019 (COVID-19) have been widely applied in many countries in order to reduce the transmission of this pandemic disease. A Movement Control Order (MCO) was implemented in Malaysia starting from the March 18, 2020 as a pandemic control strategy which restricted all movement and daily outdoor activities. We selected the most populated area in Malaysia, Klang Valley to investigate the relationship between the Coronavirus Disease 19 (COVID-19) outbreak and air pollution. Using Artificial Neural Networks (ANNs) experiments, we have determined the concentration of Particulate Matters (PM), wind speed and wind direction linked to COVID-19-related cases/deaths. Our focus is on the potential effects of Particulate Matter (PM) in spreading the epidemic. The underlying hypothesis is that a pre-determined particulate concentration can foster COVID-19 and make the respiratory system more susceptible to this infection. The empirical strategy used an innovative Machine Learning (ML) methodology. The outcome of the findings demonstrated the correlation between particulate matters and air pollution towards Coronavirus Disease 19 (COVID-19) outbreak.

Keywords: COVID-19, Air pollution, Malaysia, Artificial neural network, correlation.

Figure 30. Abstract of the project entitled 'The Relationship Between Air Pollution and Covid-19 Related Cases/Deaths: A Case Study in Klang Valley, Malaysia'

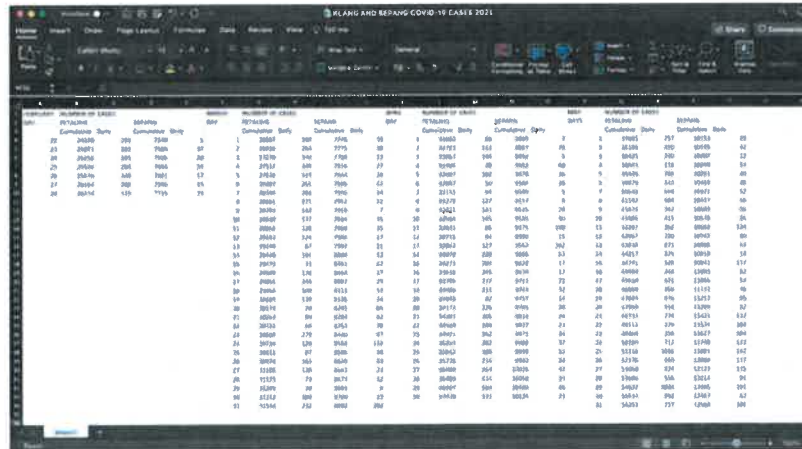


Figure 31. Data of daily Covid-19 cases in Putrajaya and Sepang

Let's not forget I was given a task to create presentation slides and record myself presenting the slides and submitted it to the conference organizers as well as participating the conference one day event in WEBEX for questions and answers.

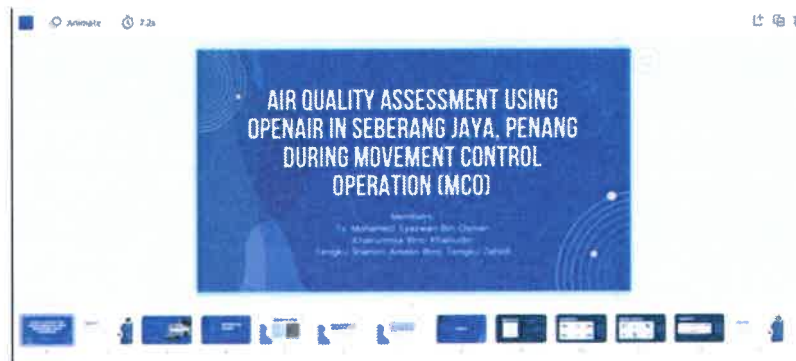


Figure 32. Presentation slides for the project entitled 'Air Quality assessment Using the OpenAir in Seberang Jaya, Penang During Movement Control Operation (MCO)



Figure 33. Certificate of participating in EnvChem 2021 conference

Week 15 – Week 17

From week 15 until week 17 is where I started working on the industrial training report. My supervisor, Sir Syazwan has granted some time of my internship duration to start focusing on writing the report. Throughout my time writing the report, I asked some questions to my colleague on the format of the report and ideas to add in my report writings. I had made a couple of arrangements in meeting up with my supervisor regarding certain information of the EMZI Holdings Sdn. Bhd. that needs to be added in my report such as EMZI's organizational chart, its mission and vision, company's background, and more.

Not to mention, while I was working on with my industrial report writing, I was assigned to assist in the laboratory works with my two lab partners namely Nor Fatimah binti Roslan and Kamelia binti Kharuddin to carry out the nanoparticle project for the face mask on the characterization of the nanoparticle. The instrument that will be used to undergo characterization of the nanoparticles is Uv-vis. Next, I was also assigned to learn with En. Ikmal on how to plot in the ANN machine for the project entitled 'The Relationship of Air Pollution and Covid- 19 Related Cases/Deaths: A Case study in Klang Valley, Malaysia'. Afterwards, I must analyze the results and start taking notes and write about the observations made.



Figure 34. Uv-vis for characterization of the nanoparticles

3.2 Description of Task Assigned

3.2.1 Participation in EnvChem 2021 Conference

Taking part in the conference event called Virtual Colloquium Series 2020-2021: International Symposium on Environmental and Green Chemistry for Sustainable Development 2021 (EnvChem 2021), activities done consist of undergoing research, writing a journal, and participating as well as presenting research done on conference virtual meetings. The research is entitled "Air Quality Assessment Using OpenAir in Seberang Jaya, Penang During Movement Control Operation (MCO)". This research is aimed to observe the changes on the air pollution around the area of Seberang Jaya as it is believed that MCO

effects the state of air quality. This research is directed in the date from 18th March 2020 to 31st May 2020.

The research is done with the use of the OpenAir software which its function to help observe and analyze the state of air quality, an open-source tool for air pollution data analysis. The OpenAir is a package that is used to analyze air pollution data is the statistical software "R" a computer programming language. This software was invented to deliver effective analysis provided with a variety of commands in the form of coding that are available in the package. The OpenAir has plenty of advantages, namely provide free, open-source set of tools that are accessible by everyone, many ranges of techniques and development of new ones, providing statistical/data analysis software that uses ideal programming language, giving fast responses and suitable for carrying out an advanced analysis in quick manners, and enabling the air quality community to help further development towards the software. For this research, a task was given to write a formal letter to the Department of Environment Air Pollution Section asking for a list of air pollution data needed such as sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}) wind direction (wd), and wind speed (ws). All units are in the International System of Units (SI units) and air pollutant data from all existing stations in the chosen area are required. The data obtained from the start of MCO which is 18th of March to 31st of May by hourly. Furthermore, I am assigned in going through tutorial lessons with Miss Khairunissa Khairudin on how to use and create different types of statistical figures with the application of OpenAir software in the form of computer coding. After understanding how it is functioning, which is then instructed to begin the research, observations, and analysis of the acquired statistical figures using the data provided by the Department of Environment (DOE) Air Pollution Section. The research activities are guided by my supervisor, Ts. Mohamed Syazwan Bin Osman and Miss Khairunnisa Khairudin.

As the research is in completion along with all the results needed, I was assigned to begin writing journal right after a discussion session with my supervisor, Sir Syazwan for guidance and further details of the instructions given. It is instructed to write in the form of Applied Environmental Research (AER) journal template. Before writing, it is essential to undergo a research upon understanding of all acquired statistical figures from the OpenAir software application and learn how to read and deliver all important information that can be extracted from each figure. The journal consists of abstract, introduction, material and methods, results and discussion, conclusion, acknowledgements, author's contribution as well as conflict of interest statements. The journal must be fully written along with guidance, including 4 drafts that must be handed over to my supervisor, Sir Syazwan for further correction which are then submitted to the conference organizer participated.

The supervisor, Ts. Mohamed Syazwan Bin Osman instructed in participating as a presenter during the day of the event which are on the 9th of June 2021 from 8 a.m. to 5 p.m. In the preparation, it is required to create a slide presentation for the research done as well as self-record presenting and submit the video and slides to the organizer. During the event, it is compulsory to stay throughout the event listening to other participants presenting their research findings, undergoing presentation and answering questions asked by the panels and other listeners.



Figure 35. Official website of EnvChem 2021 conference
'<https://sites.google.com/view/envchem2021/home?authuser=0>'

1 **Air Quality Assessment Using OpenAir in Seberang Jaya, Penang During**
2 **Movement Control Operation (MCO)**
3

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18 Received: Date Month Year; Accepted: Date Month Year; Published: Date Month Year
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21 **ABSTRACT**
22

23 Due to recent global threat COVID-19, World Health Organization (WHO) announced Public Health
24 Emergency of International Concern (PHEIC). Malaysian government has taken several measures to control
25 the cases and eventually planning on stopping it from spreading. One of the major steps taken by the
26 government is the implementation of Movement Control Order (MCO). The implementation of Movement
27 Control Order (MCO) by the Malaysian government that aimed to achieve control over the COVID-19
28 transmission throughout Malaysia is believed to affect the amount of air pollutants being released [1]. During
29 MCO, the amount of citizens activities outside home has drastically reduced because of several rules
30 implemented such as solely only allowing essential business to operate, several industries must be suspended
31 which substantially minimize traffic density and the release of industrial pollutants [2]. This study is involving
32 a list of data that are obtained from Department of Environment Malaysia (DOE) which are then be used to
33 generate varieties of statistical analysis in OpenAir software to undergo observations of the amount of air

1

34 pollutants being released throughout the area of Seberang Jaya, Penang. In conducting OpenAir, an R package
35 open-source software to assess pollutants that relates to meteorological conditions from the statistical analysis
36 obtained. The main goal of this study is to observe varieties of concentrations from major air pollutants such
37 as PM₁₀, PM_{2.5}, CO, NO₂, SO₂, and O₃ during Movement Control Order (MCO) from the start of MCO which
38 are 18th of March 2020 to 31st of May 2020. Wind direction and wind speed data acquired from Department
39 of Environment Malaysia (DOE) is vital as it is impossible to carry out this study with the absence of both
40 data. In summary, major pollutant that is released in Seberang Jaya is PM₁₀ and PM_{2.5} and the area contain the
41 highest concentration of all pollutants is most definitely be where the commercial parts of the area are located.
42 In the end, this study will clearly display statistical analysis with the use of OpenAir software application to
43 observe the levels of different types of air pollutants in this urban area with high traffics.

44

45 **Keywords:** *OpenAir, air pollution, wind rose, pollution rose, bivariate polar plot, calendar plot.*

46

47 1.0 INTRODUCTION

48

49 Air pollution are generally known as the contamination of the air whether it may be from outside or even
50 indoors. It is the alteration by means of its physical, biological, or chemical towards the atmosphere from
51 unwanted pollutants such as harmful gases, dust, smoke caused by mainly human's daily activities [3]. This
52 leading towards negative health impacts for all living things which decreases the chance of having and
53 maintaining good health as the air becomes dirtier. Study shows a normal adult typically breaths 15,000 liters
54 of air every day and easier access of harmful pollutants are to enter the bloodstreams from the lungs that
55 eventually reaches internal organs [4]. From there, severe health problems arise for instance asthma,
56 cardiovascular diseases, and cancer that are bound to reduce health quality and lifespan [5]. It could also be
57 affecting the surrounding environment caused by immediate alterations from global warming that
58 continuously increases the world's temperature that deepens sea levels from melting of ice in cooler parts of
59 the world. Acid rain caused by pollutants such as nitrogen oxides and sulfur oxides in the atmosphere from
60 burning of fossil fuels resulting in further damaging other parts of the environment. Rapid growth of green-

2

61 colored algae in lakes and ponds from developed nitrogen in the atmosphere and toxic pollutants deposited on
62 the surface of water that will affect animals in its natural habitat. Depletion of ozone layer problem is in
63 alarming stage due to the increasing emission of chlorofluorocarbons, hydro chlorofluorocarbons in the
64 atmosphere [6]. Enlisted a series of ways that creates and releases pollutants which can be divided into two
65 categories namely, natural sources and man-made sources. Natural sources of air pollution are released from
66 body processes of living things and it could also transpire from natural events in the environment. To illustrate,
67 the release of smoke accompanied by polluted gases from active volcanic eruptions. As for man-made sources
68 contributing to air pollution is further divided into outdoor pollution sources and indoor pollution sources.
69 Majorly, air pollution originates from outdoor pollution sources corresponding to power generation, vehicles,
70 agriculture or waste incineration, industry, and building heating systems. The evaluation of air quality must
71 be based on the Air Pollutant Index (API) of 6 main criteria pollutants whereby the major pollutant in Malaysia
72 would be fine particulate matter (PM_{2.5}) [7].

73 The most recent global pandemic, COVID-19 has significantly shifted the level of air pollution
74 globally. Coronavirus disease (COVID-19) is a recent discovered infectious disease that are currently the main
75 focused struggle of all humanity now. COVID-19 mainly effects the human's respiratory system that are
76 caused by novel Cov, severe acute respiratory syndrome coronavirus 2. This virus has a way for it to easily
77 spread through droplets of saliva or a discharge from the nose of another person to the other by coughing or
78 sneezing. To prevent, certain measures must strictly be followed when going outside into the public area and
79 even undergoing quarantine [8,9]. This outbreak first began in Wuhan, Hubei Province, People's Republic of
80 China in December 2019. As it drastically spreading throughout the whole parts of the world, it urges the
81 World Health Organization (WHO) has declared Public Health Emergency of International Concern (PHEIC).
82 The first ever COVID-19 cases discovered in Malaysia was on 25th of January 2020 and have since increases.
83 Several measures have been taken and implementing Movement Control Order (MCO) aiming to stop the
84 spread is one of the main measures taken. During MCO, many human's daily activities minimize drastically
85 or must have come to a stop resulting to some positive impacts especially the atmospheric air quality. Based
86 on several studies carried out with the use of satellite technology, the implementation of lockdown across the
87 globe has helped reduced severe air pollution levels that can be clearly seen in some of the world's major

3

88 cities. [10] Moreover, recent studies over Southeast Asia including Malaysia expose significant reductions
89 especially for its' PM₁₀, PM_{2.5}, NO₂, SO₂, and CO during MCO by operating aerosol optical depth (AOD)
90 observations from Himawari-8 satellite, column density from Aura-OMI and ground-level continuous air
91 pollutant measurements. 63% reduction for PM_{2.5} and CO of Malaysian Department of Environment stations
92 and other stations displays significant reduction of NO₂ concentration while MCO is in operation [11].

93 In urban areas throughout Malaysia particularly in "red zones" areas during MCO shows drastic
94 positive changes not only to break the COVID-19 chain, consequently, reduces environmental pollution as a
95 whole including air pollution as it helps reducing the release of toxic substances from variety of human's
96 activity. Groups of experts and researchers must work together to maintain these changes for the long run that
97 could help improving quality of life and the environment [12]. All in all, this study targets to evaluate the
98 recent condition of air quality at Seberang Jaya, Penang, Malaysia during Movement Control Order (MCO)
99 from 18th of March to 31st of May using data recorded continuously by the Department of Environment (DOE),
100 Malaysia aimed to prove potential meteorological influences.

101

102 **2.0 MATERIAL & METHODS**

103

104 *2.1 Study Area*

105

106 Targeted location is Seberang Jaya, Penang, Malaysia. The southern bank of Perai River which is at east of
107 Perai proper that was developed in the 1970's by the Penang Development Corporation (PDC) aimed to allow
108 housing area that are suitable with growing industries in Perai as well as getting rid of social and economic
109 inequalities in urban and rural parts of Seberang Jaya. Years after, Seberang Jaya evolved with booming area,
110 various commercial and retail development [13]. Suburb area that are considered urban with high traffic
111 density. This area has sparked curiosity on its' air pollution as the permanent resident here. Based on
112 According to Figure 1, the closest industrial areas to Seberang Jaya are Mak Mandin Industrial Area and Perai
113 Industrial Area, which are both 2.63 km and 3.70 km away, respectively. Furthermore, the Seberang Jaya area
114 is densely packed with residential and commercial areas.

4

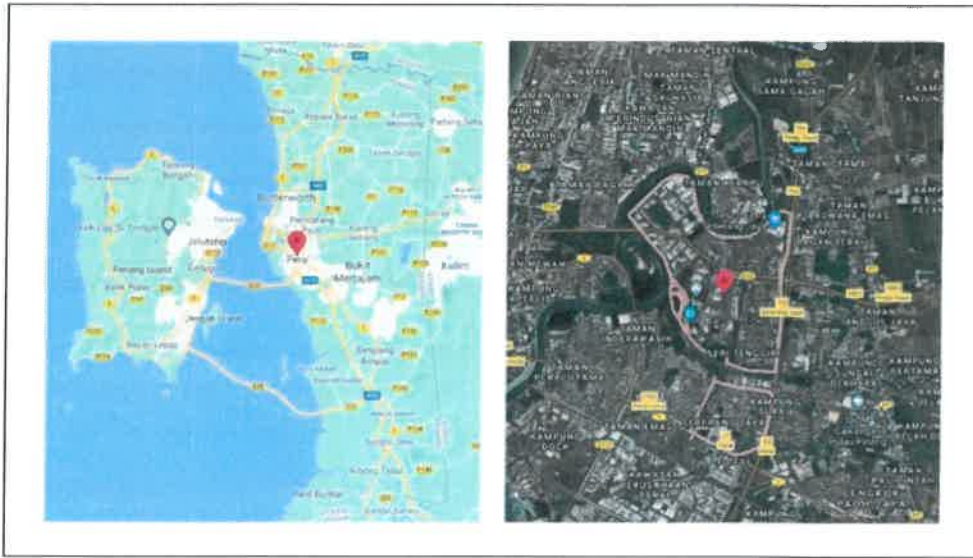


Figure 1: Map of Seberang Jaya, Penang, Malaysia

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119 **2.2 Department of Environment Malaysia (DOE) Data**

120

121 This study requires the official Department of Environment Malaysia (DOE) data to carry out further
122 investigation. The air pollution data required would include sulfur dioxide (SO₂), nitrogen dioxide (NO₂),
123 carbon monoxide (CO), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}) wind direction (wd), and wind speed
124 (ws). All units are in International System of Units (SI units) and air pollutants data from all existing stations
125 in the chosen area are required. The data obtained from the start of MCO which is 18th of March to 31st of
126 May by hourly.

127

128 **2.3 OpenAir**

129

130 The state of air quality is observed and analyze using OpenAir, open-source tools for air pollution data
131 analysis. OpenAir is a package that is used to analyze air pollution data that works in statistical software "R"
132 a computer programming language. This software was invented to deliver effective analysis provided with

5

133 variety of commands in the form of coding that are available in the package. OpenAir has plenty of advantages
134 namely provide free, open-source set of tools that are accessible by everyone, many ranges of techniques and
135 development of new ones, providing statistical/data analysis software that uses ideal programming language,
136 giving fast responses and suitable carrying out advanced analysis in quick manners, and enabling air quality
137 community to help further development towards the software. Furthermore, this software has developed 7
138 special features that can be used in numerous ways and continues to develop more input from developers [14].
139

140 *2.4 Statistical Analysis*

141

142 Expected types of air quality statistics and figures obtained from OpenAir software application including wind
143 rose plot, pollution rose plot, calendar plot and bivariate polar plot. The statistics will be displaying average
144 air quality condition in the duration selected.

145

146 **3.0 RESULT AND DISCUSSTION**

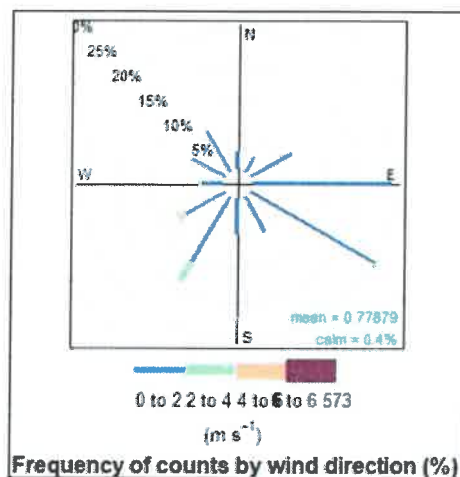
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148 Representation of data in Figure 2 that helps understanding the condition of the wind direction, wind speed as
149 well as frequency of counts (%). This statistic is important as it is used to evaluate weather condition and
150 climate whereas wind direction determines the quality of air [15]. Wind rose shows the general wind direction
151 generated and wind speed with the use of color coding provided right under wind rose figure which estimated
152 the ranges of speed it moves in certain parts of the area. The length of each "spoke" indicates the frequency,
153 which means the number of times the wind blew in that direction [16]. From overall perspective, the movement
154 of the wind is identified to be higher than average readings. The wind rose displays that during this sampling
155 period, highest frequency of wind blowing comes from around the east to south direction 20% of the time with
156 the maximum wind speed reached of about 2 to 4 ms⁻¹. The fastest wind speed reached of about 4 to 6 ms⁻¹ in
157 the direction from west to south alongside 10-15% frequency at the time. The lowest frequency of the wind is
158 located around north to west area as the highest frequency reached approximately around 5-10% with a
159 maximum wind speed reached of about 2 to 4 ms⁻¹. The mean value of the wind speed is 0.77879 ms⁻¹ with

6

160 an overall calmness of about 0.4%. From the result stated, it has linear correlations with another study that
 161 proves wind speeds shows direct changes in its speed to be much faster than the average wind speed before
 162 MCO. Wind speed during MCO which starts in March is moderately higher compared with months prior to
 163 this month yet for calm winds for other months are all very low. In any daytime during MCO the wind starts
 164 to blow significantly in the West, South and East side of the area with higher than the average wind speed in
 165 previous months [17].

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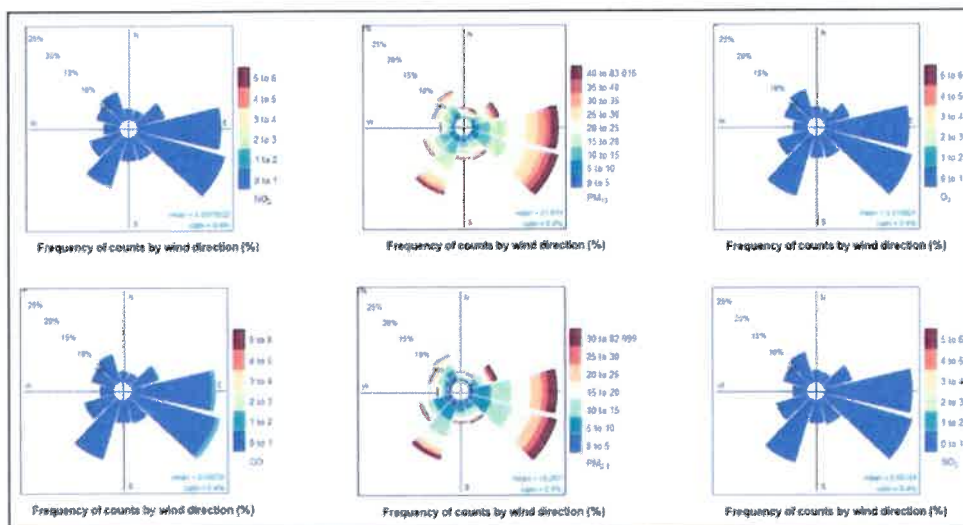
Figure 2: Wind rose plot of Seberang Jaya Area

171 Pollution rose assist to conjure up an image of wind pattern for 6 main types of pollutants present.
 172 Pollution rose in one of other variant of wind rose focusing on the concentration of pollutants by wind
 173 direction. It is also functioned in estimating the level or snapping point for a particular pollutant with the use
 174 of supplied data set given to it. This statistics in Figure 3 helps exploring interesting results that are influence
 175 in day-by-day timing and circumstances [18]. Based on Figure 3 demonstrated, the overall shape is
 176 predominantly similar out of all six pollution rose of different types of pollutants. The highest source of air
 177 pollution from all six pollutants arising out of around east to south of the overall area as shown in Figure 3. It
 178 is identified that PM₁₀ pollutant is the major source of air pollution around the area of Seberang Jaya, Penang,
 179 Malaysia with a maximum concentration of 83.016 ppm. Secondly, PM_{2.5} is recognized to hold a maximum

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180 concentration of 82.999 ppm following by CO with 2 ppm concentration. Ultimately, SO₂, NO₂, and O₃ holds
 181 the lowest concentration in the atmosphere that curbs with only around 0 ppm to 1 ppm of its concentration.
 182 Mean value listed revealed to be 0.0077632 ppm (NO₂), 21.674 ppm (PM₁₀), 0.018825 ppm (O₃), 0.58235
 183 ppm (CO), 15.267 ppm (PM_{2.5}), and 0.00104 ppm (SO₂) during MCO. The percentage of calmness for all six
 184 of pollutants present is 0.4%. A study identifies an overall percentage drop of air pollution during MCO and
 185 the results displays approximately 20–60% of measured air pollution dropped at most locations throughout
 186 Malaysia [19]. From the pollution rose results acquired, it can be concluded that the level of pollutants had
 187 dropped drastically as it shows lower average value of pollutants compared with average value of pollutants
 188 months prior to COVID-19 pandemic.

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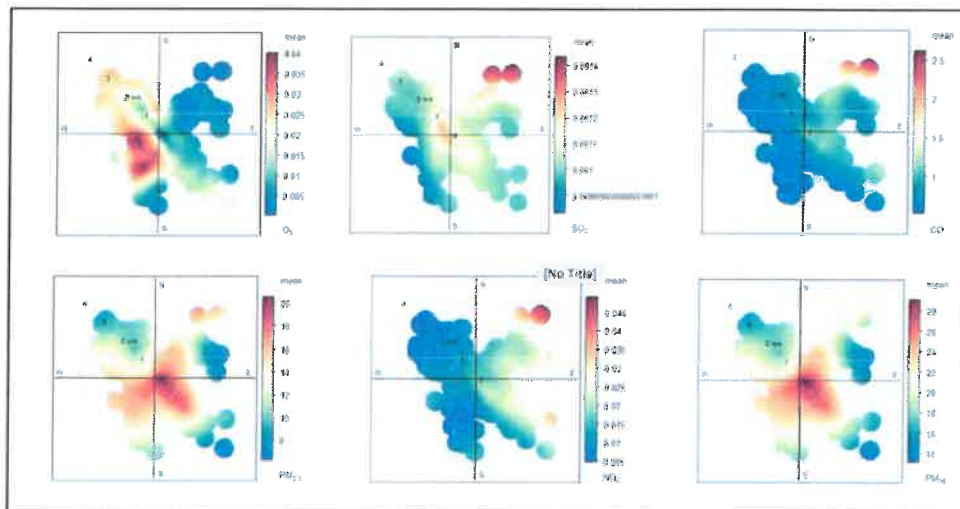
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Figure 3: Pollution rose for NO₂, PM₁₀, O₃, CO, PM_{2.5}, and SO₂

195 Figure 4 statistics functioned to study pollutants through correlation and regression. Polar plots are
 196 created by calculating the mean concentration for wind speed as well as wind direction bins, demonstrated
 197 that multiple of sources from all six pollutants displayed at Seberang Jaya, Penang Malaysia on the 18th of
 198 March 2020 to 31st of May 2020 [20]. Suggested that elevated concentration in certain parts of Seberang Jaya
 199 alongside with low wind speeds is highlighted in color from red (highest) to blue (lowest). Figure 4 displays

200 the location specifically where the highest to lowest production of each types of pollutants depending on its'
 201 mean value concerned at the right side of the polar plot. Highest source of pollutants is in the area from west
 202 to south with mean value 0.04 ppm (O_3), north to east with mean value 0.0014 ppm (SO_2), north to east with
 203 mean value 2.5 ppm (CO), middle region with mean value 20 ppm ($PM_{2.5}$), north to south with mean value
 204 0.045 ppm (NO_2), and middle region with mean value 28 ppm (PM_{10}). The correlation polar plot in Figure 4
 205 demonstrates that, $PM_{2.5}$ and PM_{10} occupies the biggest area of its' highest source of pollutants highlighted
 206 accompanied with O_2 , followed by SO_2 , NO_2 as well as CO. From overall perspectives, PM_{10} as well as $PM_{2.5}$
 207 is an expected major pollutant in Seberang Jaya region as Malaysia is known to contain PM_{10} and $PM_{2.5}$ the
 208 most in comparison with other types of pollutants [2].

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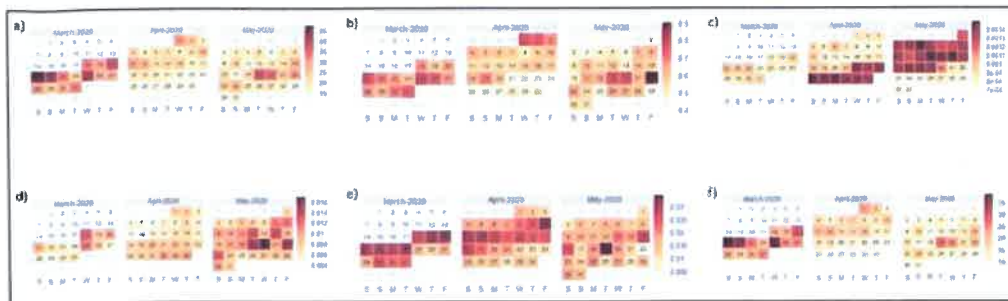


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Figure 4: Bivariate polar plot for NO_2 , PM_{10} , O_3 , CO, $PM_{2.5}$, and SO_2

214 Statistic to show pollutants concentration for each day from 18th of March to 31st of May is accessible
 215 in Figure 5 calendar plot of PM_{10} , $PM_{2.5}$, CO, NO_2 , SO_2 , and O_3 . The information obtained helps in forming
 216 some type of idea in the way of meteorological conditions in each day that also highlighted certain value more
 217 clearly. Daily mean concentration value for each pollutant is located at the right side alongside the color coding
 218 that represent different value of concentration that each containing different shades of color [18]. From overall

219 perspective, the highest concentration reached is on 21st of March 2020 with mean value of 45 ppm (PM₁₀),
 220 22nd of May 2020 with mean value 0.9 ppm (CO), 27th of April, 4th, 12th, 14th of May with mean value 0.0014
 221 ppm (SO₂), 20th of May 2020 with mean value 0.016 ppm (NO₂), 19th of May 2020 with mean value 0.03 ppm
 222 (O₃), and 21st of March 2020 with mean value 35 ppm (PM_{2.5}). Pollutant SO₂ is considered to release its
 223 maximum concentration value the most often as it contains the highest amount of darker shade in its calendar
 224 plot followed by the release of O₃, CO, NO₂, PM_{2.5} as well as PM₁₀. The observations found on Figure 5 can
 225 be clearly presumed that the average daily mean calendar plot on all pollutants is reduced from before MCO
 226 and during MCO. Since daily vehicles journey has substantially being reduced immediately upon MCO
 227 including weekday counts of about 20–30% is surveyed in early March [21].
 228



229 Figure 5: (a) Calendar plot of PM₁₀ (b) Calendar plot of CO (c) Calendar plot of SO₂ (d) Calendar plot of
 230 NO₂ (e) Calendar plot of O₃ (f) Calendar plot of PM_{2.5}
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 232
 233

234 4.0 CONCLUSION

235
 236 Seberang Jaya is predominantly a domestic district covered in the north, south and east of an overall area
 237 including a little coverage of industrial area directed at the west side and commercial area in the middle parts
 238 of Seberang Jaya mainly. Figure 2 and Figure 3 disclose the most frequent emission of pollutant came from
 239 east to the south side of Seberang Jaya alongside with low wind speed primarily around 0-2 ms⁻¹. That being
 240 the case stated that the area dominating highest frequency is mainly domestic region as well as commercial
 241 region of Seberang Jaya. This due to the fact MCO shifts the major frequency of air pollution from industrial
 242 region to domestic region as certain activities in industrial sector must stop or minimizing its operation due to

243 laws and regulations by the Malaysian government [2]. In Figure 3, Seberang Jaya consists of PM₁₀ and PM_{2.5}
244 as the major pollutants in addition to the other four main pollutants namely NO₂, SO₂, CO, and O₃ is supremely
245 in low value that can almost be disregard as compared with PM₁₀ and PM_{2.5}. There is no direct knowledge of
246 different sources of certain activities that contributes to the release of PM₁₀ and PM_{2.5}. However, Figure 4
247 indicates the location of multiple sources of PM₁₀ and PM_{2.5} that focused on the middle region of Seberang
248 Jaya. Knowingly, the middle parts of Seberang Jaya are predominantly a commercial district where high
249 traffics take place. Long-range transport with high density of traffics could be the main source of PM₁₀ and
250 PM_{2.5} emission from transportation vehicles. Maximum contribution only happens with lower wind speed
251 plus, highest concentration is reached when local traffic emissions influence the monitoring site [20]. From
252 comprehensive view of Figure 4 demonstrates that middle region and north to east region consist of high
253 concentration of pollutants. This grants an idea where commercial region of Seberang Jaya emits the most
254 pollutants as compared with domestic and industrial region of Seberang Jaya. Based on daily concentration of
255 all six pollutants displayed in Figure 5, SO₂ is releasing the highest concentration most regularly especially
256 around the end of April and early May in comparison with the other pollutants. Overall calendar plot from
257 Figure 5 proclaims weekend days tends to release higher number of pollutants compared with weekdays.

258

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260

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265

266 **AUTHOR'S CONTRIBUTION**

267

268 Tengku Shamim Amelin binti Tengku Zahidi wrote formal letter to DOE air quality section to conceive needed
269 data, compiled data for analysis, conducted data analysis and processing, plotted and combined statistical
270 figures, undergone important research in completing the manuscript, evaluate results and wrote this paper. Ts.

11

271 Mohamed Syazwan bin Osman provided ideas and designed the research, provided budget for OPENAIR
272 Training Workshop, further evaluated the results, offered useful advice and detailed explanation of the study,
273 reviewed and re-examined this paper, revised paper format, helped read and approved the final manuscript.
274 Khairunnisa binti Khairudin participated in the OPENAIR Training Workshop, provide guidance when
275 analyzing data with OPENAIR software, reviewed the paper, improved the structure of the paper, and ensured
276 the manuscript follows the right formatting.

277

278 **CONFLICT OF INTEREST STATEMENT**

279

280 There were no conflict of interest arises while engaging this research.

281

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Figure 36. Completed journal of project entitled 'Air Quality Assessment Using OpenAir in Seberang Jaya, Penang During Movement Control Operation (MCO)'

3.2.2 Synthesis nanoparticles for the production of face mask lab project

Assisting a lab group consisting of three members that targets to create an invention of face mask using nanoparticles that acts as a good antibacterial property when wearing the face mask. The nanoparticles are in the form of liquid and will be placed in a spraying bottle which are then be sprayed at the outer part of a plain mask material when it is to be used. This lab has to go through 3 methods of nanoparticle production along with multiple trials to get the ideal results. The job given is mainly measuring the right amounts of materials, checking latest temperature every couple of minutes while heating or mixing, setting a timer, as well as cleaning up tools and spills.

Instructed to undergo the first method which to synthesize Cu-Ag NPs a one- pot method in the air. Firstly, 1.4 mmol, 0.25 g of $\text{Cu}(\text{Ac})_2$ is mixed in 30 mL of OAm inside a 100 mL three-neck flask and stirred at 100 °C for 30 min until $\text{Cu}(\text{Ac})_2$ until it is fully dissolved. Then, the solution was heated to 200 °C and held at this temperature for 3 h. After the dark red solution was cooled down to room temperature, it is identified that 1.4 mmol, 0.336 g for 1:1 molar ratio between Cu and Ag of AgNO_3 was completely dissolved in 30 mL of OAm and added dropwise at 500 rpm for 1 min in the solution above. The mixed solution was heated to 80 °C and kept at this temperature for 2 hours. Finally, hexane and ethyl alcohol were added, to wash the particles. In acquiring solid particles, the grey solution must be centrifuged five times at 10,000 rpm for 15 minutes. The solid is then dried in a drum wind drying oven for 24 hours, and a section of the product dispersed in hexane for further use. The 15 vol % Cu-Ag nano corncoobs of conductive inks prepared with mixing nanoparticles with ethylene glycol and ethanol for about 30 minutes. It is then being coated onto clean glass substrates, cured, and sintered at 100, 140, 180, 220, and 260 °C in about 1 hour in vacuum (50mTorr) surrounding.[2] Though the experiment is thoroughly followed, there is no expected reaction taking place.

The second method is by synthesizing monodisperse Cu and Cu@Ag nanocrystals that results in aging of core/shell nanostructure. By following a certain protocol, Cu NPS is synthesized. 0.096 mmol, 0.016 g for 4/1 atomic ratio between Cu and Ag of AgNO_3 will be mixed with 8mL of oleylamine (OAm). Right after it is bubbled containing N_2 after a couple of minutes, dropwise is added for over 2 minutes in the Cu NPs dispersion with the use of syringes. As it run under nitrogen, the dark solution is stirred overnight at room temperature. Between 75°C and 150°C, further heating is undergone for 2 hours. Approximately at 6000 rpm for 30 minutes, hexane must be added when the dispersion was centrifuged three times to separate solid material. It is expected to obtain blue/red-colored dispersion by dispersing the dark solid

in hexane. [3] However, the product obtained gone through agglomeration. Due to that reason, the second method is also a failure.

After experiencing two unidealistic results, the next task is to undergo the third method. The third method is prepared using a two-step polyol reduction process under bubbling N₂ gas. To start off, 3.33 g, MW: 10000 of PVP is dissolved in 27.5 mL of EG solution while continuously stirred in 100 mL three-necked flask that was heated to 110°C for 1 hour along with bubbling nitrogen gas added to remove oxygen gas dissolved. Next the solution is heated at 196°C and 2.5 mL of 48 mM Cu(OAc)₂. The H₂O in EG was added by drops with the use of syringe pump with an injection rate of 2 mL/min. The solution is then maintained at constant temperature for 2.5 minutes in preparation of Cu core nanoparticles. In preparing the Ag shell, 4mL of 15mM AgNO₃ was injected at an injection rate of 6 mL/min. Using a water bath, the reagent is cooled and while Ag shell is being fabricated, nitrogen gas bubbled continuously. Product solutions acquired is then centrifuged at 13000 rpm three times for 15 min each time. The precipitates were then redispersed in deionized water.[4] The third method was a success and ideally satisfied the aim of this study. Characterization of nanoparticle using Uv- vis for further testing of the developed product of face mask material is not yet being carried out.

3.2.3 Participation in the 5th International Conference on Global Sustainability and Chemical Engineering (ICGSCE 2021)

The ICGSCE has been organized by the School of Chemical Engineering, College of Engineering, Universiti Teknologi Mara (UiTM), Malaysia on a bi-annual basis. The ICGSCE 2021 is the V series with the main purpose to explore the diversity of studies in the field of chemical engineering and related components. The ICGSCE 2021 promotes interactions among scientists, engineers and academics from research institutions, universities, and industries around the world to discuss recent discoveries in the context of global sustainability especially in the field of chemical engineering. The ICGSCE 2021 will include the participation of renowned keynote speakers, oral presentations, poster sessions and technical conferences related to the topics dealt with in the ICGSCE 2021 Scientific Program. The venue will be held in the virtual conference through WEBEX. The abstract submission is 1st July 2021, full paper submission is before the 1st August 2021, and camera-ready deadline is 20th August 2021.

Taking part in a conference for the second time with a new aim of objective which is focused on the potential effects of Particulate Matter (PM) in spreading of COVID-19. This research

has selected Klang Valley, Malaysia as the core location for this study, which has the highest density of citizens in Malaysia. Aimed to determine the relationship between the Coronavirus Disease 19 (COVID-19) epidemic and air pollution. This time, it is decided to use Artificial Neural Networks (ANNs) experiments and the concentration on Particulate Matters (PM), wind speed and wind direction linked to COVID-19-related cases/deaths to be determined. It is believed that pre-determined particulate concentration can stimulate COVID-19 and make the respiratory system more susceptible to this infection. The empirical strategy used an innovative Machine Learning (ML) methodology.

This research group consists of five members namely, Tengku Shamim Amelin Binti Tengku Zahidi, Khairunnisa binti Khairudin, Ahmad Zia UI Saufie, Mohd Ikmal Fitri Maruzuki, and Mohamed Syazwan Osman. Each group member has their own part to fulfil. Tasks given are mainly collecting daily COVID-19 data on the focused location, writing the manuscript, and undergoing further research online.



Figure 37. Official website of ICGSCE 2021 conference

["https://submit.confbay.com/conf/icgsce2021"](https://submit.confbay.com/conf/icgsce2021)

CHAPTER 4

CONCLUSION AND RECOMMENDATIONS

4.1 Recommendation

Throughout my internship duration working under EMZI Sdn. Bhd. lists of recommendation constructed based on my observations are as follows:

- Always asking more questions regarding any task given, especially on the lists of data that need to be gathered to abstain from redoing the data all over again as it may occupy more time to finish the project.
- Joining OpenAir Training Workshop instead of learning from a senior as it is a very difficult application and should be learnt properly to ensure the research can be carried out smoothly.
- Being extra aware of the temperature inside the three-neck flask at all times as it is extremely sensitive towards the temperature with the purpose that the reaction inside of the flask can occur successfully at optimum temperature.
- Occasionally check up on group members of the research project on their work updates and progresses to ensure all parts are given on time to avoid any last minute rush before the due dates of journal submission.
- Checking all instruments that will be used for any defect to make sure that the lab session can go smoothly and without redoing the experiments multiple times leading to a waste of materials.
- Asking for a proper guideline from supervisors may really help a lot in such manner to know exactly on what to do and into being much more organized into completing the task given.
- Making sure the source of information that will be used for the research is from trusted sources so that the project done would be accurate and success.

4.2 Conclusion

I have gained numerous knowledge, experiences and skills that may be useful in the future to face challenges in the working environment after 17 weeks spent at the Chemical Engineering department under EMZI Holdings Sdn. Bhd.. Through the practical training, I have gained an exposure to work coordination in an environment which is conducive coupled with friendly staff and colleagues that always there to help.

Along my training period, I have recognized that observing and asking questions are the main elements to find out the root cause of a problem. Not to mention, this internship has helped me to learn independently, disciplined myself, being considerate and patient, self-trust, taking initiative and ability to work on a task. To be working here with other different people from the chemical engineering department teaches me uncountable soft and hard skills that cannot be learned in the classroom.

To conclude, my internship has been excellent for various reasons and lastly, I got the opportunity to expose myself in the working environment related to my course, chemical engineering.

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