



Cawangan Johor
Kampus Pasir Gudang



INDUSTRIAL TRAINING REPORT

CHE353

ITS ENVILAB SDN BHD

PREPARED BY

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1.0 ABSTRACT

Industrial training is a crucial stage of a student life. An excellent and proper training accomplished helps in expanding knowledge and work ethic of industries. The industrial training report is a thorough report from the first day until the end of the day of the Industrial training. The trainee had finished a practical of 16 weeks more at the chosen company by the trainee starting from 1st of March to 15th of July 2021. The company that has been chosen by the trainee is ITS Envilab Sdn Bhd, Johor. The trainee was placed in the Project Unit department at Envilab, Johor. The objective of the industrial training is to expose student with the actual work surroundings in the industry or fields about the course that trainee have adapted and they can improve their learning and skill by observing and involving them in the industrial training course. Along the industrial training, the trainee has been exposed and taught to diversity of works in the Project Unit department. The trainee is able to complete the tasks given by determination and dedication. At the end of the industrial training period, the final report consists of information of the organization which is about work that has been done by the trainee go through along the industrial training and the conclusion of the entire report were made. This report contains of introduction, company background, weekly summary based on logbook, task assigned and conclusion. Each of it has its own sub tittles to be summarized.

2.0 ACKNOWLEDGEMENT

Assalamualaikum w.b.t.,

Alhamdulillah and thanks to Allah that has ease my way in the journey of completing eight weeks of industrial training. The most thankful and grateful to the Almighty that gave me His bless and mercy to always put trust in His plan.

I could not have completed the industrial training without the help, love and support from profusion of people. First and foremost, I would like to thank my beloved parents for the enthusiasm and be invaluable person as my number one supporter of me from the days of searching for training places till the day I finished the industrial training. All the sacrifices of my parents are very significant to me.

Besides, I would like to thank the Faculty of Chemical Engineering for all their help and encouragement especially Miss Noor Hidayu binti Abdul Rani, the Coordinator of Industrial Training (CHE353) course. The guide and support in managing all the matters related to the course truly helps the student a lot in achieving the objectives of the industrial training.

Moreover, the most thankful I bid to my supervisor, Mr. Mohd Abdul Hafiz bin Zakaria, my mentor, Miss Nurul Atikah binti Zainal and all the staffs of Project Unit department for allowing me to work and learn in their respective organization. I have gained a lot of valuable experience and knowledge of the Research & Development, R&D room and office works that I have been placed. Their patience in providing me with the best answer that can help me understand the nature of work, their understanding and kindness, I appreciated the most in my Industrial Training time. Without their support, I would probably have finished my industrial training with bad experience and least of knowledge.

Finally, thank you to all my friends that I have cherished for the helps, support and advices that has been given to me. Without their support and reassurance, listening and reading all my thoughts, and giving me constructive criticism when I needed it, I may not finish my training and completing my final report.

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3.0 INTRODUCTION

First of all, at the beginning of semester 6, students are briefly explained about the Industry Training course. Industry training is one of the compulsory courses for students to complete their diploma together with university graduates and obtain their diploma certificate. The industry training takes about 16 weeks in the period from 21 March 2021 to 17 July 2021. The industry training company is chosen by the students themselves. Industry training is introduced as work experience done during a program of study that is relevant to professional development before graduation that must be related to the course taken by the student, namely Chemical Engineering. Students have the freedom to choose either a government or private company as long as they are eligible to complete industry training.

This industry training is very important especially for engineering students. This will help students refresh and master the skills relevant to their course. Students will be able to acquire more knowledge that is outside the university learning environment such as office management, improving soft skills, tactical experience, knowing more departments, communication skills with staffs as well as clients and many more making it a once in a lifetime opportunity. During industry training, each working day must be recorded in a log book provided by the coordinator and evaluated by the supervisor or mentor in charge depending on the evaluation provided in the log book each week. Students are assessed based on their work performance such as learning ability, application of knowledge and quality of work done by students. In addition, students will also be assessed based on positive ethics and professional values whether students comply with organizational rules and regulations, work with staffs and company manager and other relevant. For example, students must know and abide by the rules and laws of the organization such as not taking photos or videos without prior notice or permission from the person in charge because company property has many confidential files. Students have been placed in offices that teach students about reporting and there are also times where students have to move to the R&D room or to the laboratory for testing and analytical examination of a sample.

Lastly, the objective that needs to be achieved by students at the end of industry training is to gain new work experience by performing tasks, evaluations, participating in training and the impact of responsibilities in the company. In addition, it will provide a bonus for the marketability of students to apply for jobs in the future and students will get an idea of working in the field or the job they have studied.

4.0 CONTENT

4.1 ORGANIZATION CHART AND HISTORY OF THE COMPANY

4.1.1 HISTORY OF ITS ENVILAB SDN BHD



Figure 1. Logo of ITS Company

Over a span of more than 40 years, ITS has developed itself as an integrated scientific solutions group in Asia, through core businesses in Science & Medicine, Water & Environmental Management and Food & Nutraceuticals products. ITS has served in marketing high quality products, solutions and services that will improve the quality of life through R&D (Research & Development) and environmental conservation. ITS has also partnered with manufacturers from North America, Europe and Asia where it is a respected market leader in their own field to bring the best and most developed research technologies and methodologies to their clients.

Need a network of ITS facilities in Asia in integrating related products and services and synergistically be able to serve their partners and clients in a better direction. It is in line with the views of those who make an impact in the industry it serves. ITS Group of companies has regional offices in 7 countries and a well-established network of operations and warehouses throughout Southeast Asia. The company's ITS Group includes offices in Malaysia, Singapore, Thailand, Indonesia, the Philippines, Vietnam, Myanmar and China. The existing ITS Group of companies consists of three different groups each of which provides different services to the ITS Scientific Group, ITS Water & Environmental Management Group and the ITS Food & Nutrition Ingredients Group.



Figure 2. ITS Network

ITS Scientific Group is a business division under ITS Group at the regional level serving as a leading provider of scientific & medical instruments, hospital infrastructure and laboratory furniture. Their dedicated sales and service engineers will provide full laboratory preparation and solutions, with their range of state-of-the-art equipment and supplies. Offices for the ITS Scientific Group can be found at ITS Science & Medical (Singapore), Interscience (Malaysia), ITS Thailand, ITS Vietnam, ITS Science Indonesia, ITS Science Philippines and ITS Labworks (Malaysia). Then, ITS Food & Nutraceutical Ingredients Group has provided natural, healthy and safe food ingredients to form a way of processed foods that can promote a balanced and healthy lifestyle.

ITS Nutriscience (Malaysia), ITS Nutriscience (Thailand), ITS Nutriscience (Vietnam) and subsequently ITS Nutriscience (Indonesia) are the offices that house this group. The last business division under ITS Group, ITS Water & Environmental Management Group, is also a business division under ITS Group that offers chemical and engineering solutions for orderly applications in water management, water and wastewater treatment and finally in pollution control. the rest of the industry. Offices for this group are only available in Envilab (Malaysia), Envilab (Myanmar) and ITS Envirochem (Singapore) only.

The strength of ITS lies in its unique ability in synergizing various types of products and services with the technical knowledge and applications they have. The integrated solutions created are capable of improving overall performance and total efficiency expansion. In addition, the ITS Culture Core is through a structured range consisting of 3 core values to accommodate the different strengths of ITS members to form a convergent impact on the landscaping industry realizing ITS's corporate mission, "Bringing Knowledge to Society, and Possibility of Inspiring towards the good of society".

These core values are:

- ❖ Professionalism - Politeness, dignity and respect in return for the delivery of high values shown by each individual
- ❖ Performance - Inspiration and direction to maximize the career potential of ITS employees through effective delivery of business results
- ❖ Partnership - Ongoing relationships with partners, clients and staff for greater value in the ITS business ecosystem

4.1.2 ENVILAB MALAYSIA : ENVILAB SDN BHD (JOHOR)

Envilab Sdn Bhd (under the ITS Group of companies) is a Malaysian wastewater treatment & analysis equipment company that has offered applications in wastewater treatment as well as waste pollution control. Established in 1978 and registered on 20 October 1978 which is the only ITS company in Malaysia focused on ITS Water & Environmental Management Group while the headquarters for this group is located in Singapore. There are four branches of this ITS group of companies established in Malaysia, namely Envilab Sdn Bhd in Shah Alam, Melaka, Penang and Johor. The company is a one-stop environmental consultant through its capabilities in water and air pollution testing and control for which it is supported by an in-house ISO/IEC 17025 accredited laboratory. The company also offers Environmental Impact Assessment and related services. Ion Exchange India Ltd. from an Indian company is one of the suppliers for Envilab Sdn Bhd whose product is ion exchange based on indion polymers 220 NA while the trading partner for Envilab Sdn Bhd is Gulbrandsen Technologies India Pvt. Ltd. and Ion Exchange India Ltd. Both these companies are also from India.

Student spend time in her industrial training at Envilab Sdn Bhd located in Taman Pelangi, Johor Bharu. The company has provided a full spectrum of environmental services, environmental reporting (EIA, EMP, DOE Approval), pollution control systems (wastewater treatment, air pollution control systems), environmental monitoring (effluent, air monitoring). As such, the company has assets consisting of office and laboratory certified by SAMM for analysis. The size of the company can only accommodate 11 until 50 staffs.



Figure 3. Envilab (Johor)

4.1.3 NATURE OF THE BUSINESS

Water is the basic substance of life. Without water, life on earth as we know it, would not have been possible. With a growing population, and exponential industrial growth, water is one of the fundamental necessities to keep the industry running. To ensure sustainable economic growth and minimal environmental impact, Envilab Sdn Bhd will ensure proper water and wastewater treatment is necessary through several scopes of employment provided.

- ❖ **Environmental Pollution Control** - The rapid growth of the industrial sector in ASEAN countries has led to the need for pollution control to prevent damage to our environment and aquatic life. The company is committed to developing skills, technology and expertise in environmental engineering to balance industrialization and environmental conservation. The company will conduct an Industrial Effluent Treatment System (IETS) at the customer's industrial area. Among the controlled management are:
 - Industrial wastewater treatment plant
 - Solids Waste Management System

- ❖ **Specialty Chemicals** - To provide a complete range of services, the Research & Development (R&D), division of ITS has formulated various ENVIFLOC / ScaleGard series of chemicals. These chemicals are specially formulated and manufactured and used by the Envilab company for a wide variety of treatment applications.
 - Raw Water Treatment
 - Wastewater Treatment
 - Industrial Cleaning Chemicals

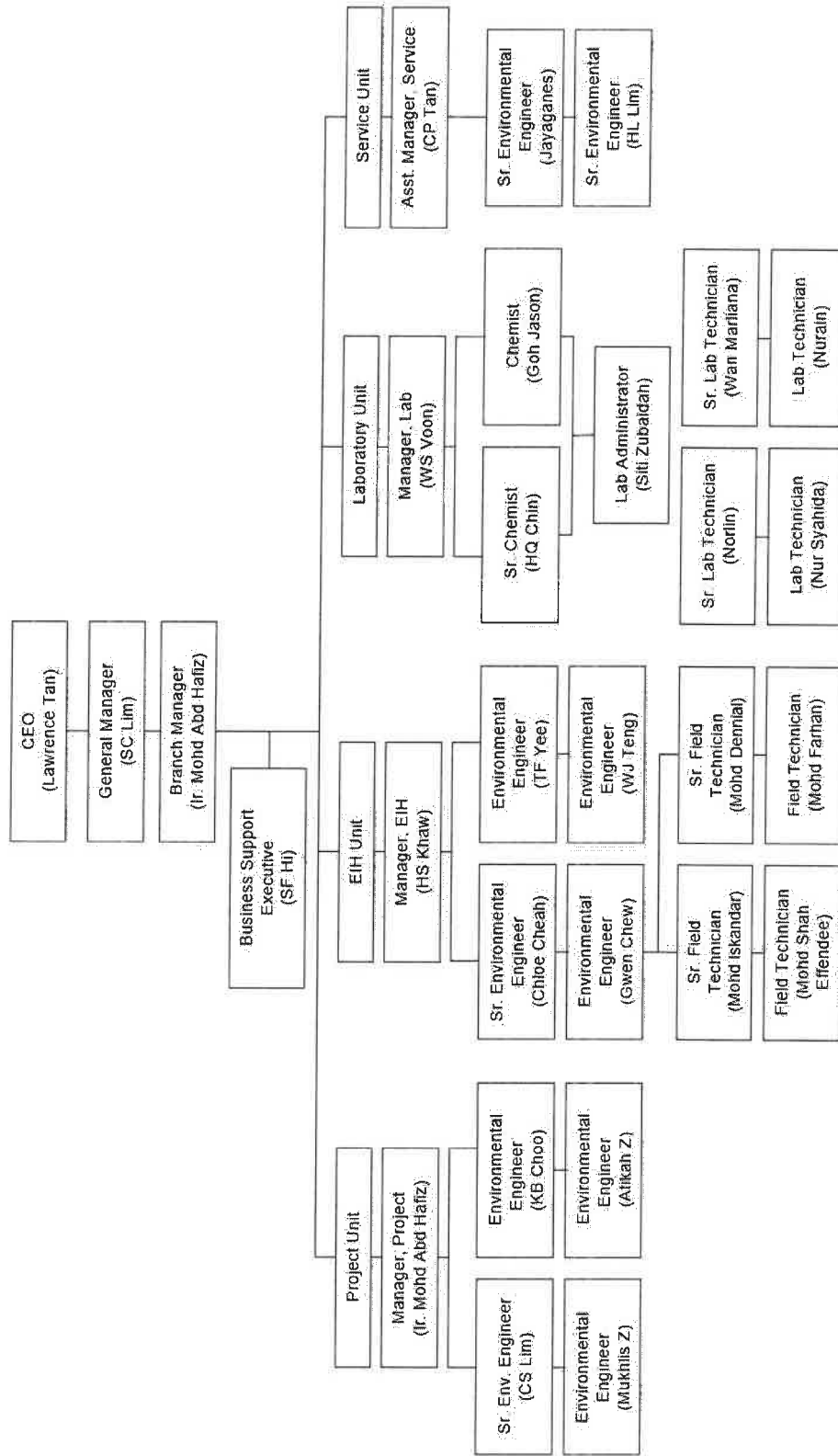
- ❖ **Sludge Management** - ITS has developed specialized solutions to manage the process and disposal of sludge that is being generated during surface treatment of water, wastewater, industrial processes and natural sludge in contaminated lakes or rivers. Envilab Company has purchased facilities provided by other ITS companies for several purposes in this sludge management, namely:
 - Chemical Dosing Skid
 - Consultation Services

- ❖ **Environmental Services** - Envilab Company promotes sustainability in the community through the continuous development of best business practices and consulting services to reduce the impact of business on the environment. It provides a range of services to achieve an optimal balance between economic growth and the impact of the business environment. Among the environmental services involved are:
 - Ambient Air Monitoring
 - Boundary Noise Monitoring
 - Wastewater Treatment Plant Performance Monitoring
 - Environmental Impact Assessment (EIA) (Reporting)
 - Environmental Management Plan (EMP) (Reporting)
 - Department of Environment (DOE) Submission / Documentation / Approval (Reporting)
 - Written Declaration

- ❖ **Industrial Engineering** - The pace of globalization and industrialization has increased rapidly in recent times and Envilab company has taken this opportunity to follow this widening trend through the scope of the company's engineering services to help customers achieve optimum efficiency in their operations. This engineering service will be performed by Envilab engineers, including:
 - Process Tank Design & Fabrication
 - General Engineering Works
 - Preventive Maintenance Services

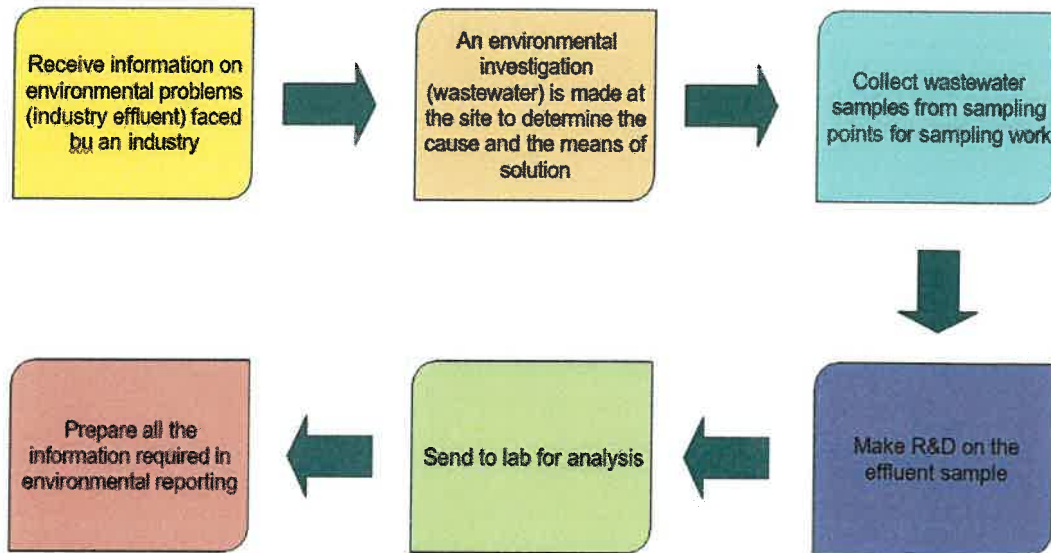
- ❖ **Products** - Products play an important role in any system and process. It helps achieve optimum levels of efficiency and effectiveness in systems and / or design processes for the Envilab company for its clients. As such, ITS provides a wide range of products to support solutions that help Envilab meet the needs of their clients. Among the products used by Envilab are:
 - Chemical Dosing Pump
 - Ion Exchange Resin
 - Water Analysis Instruments & Test Kits
 - Water Quality Instruments
 - Liquid Analytical Instruments

4.1.4 ORGANIZATIONAL CHART ENVILAB JOHOR BAHRU PROJECT



4.2 PROCESS FLOW

This is a process flow chart in general when there are clients who want to get help from environmental services from Envilab:



4.3 BRIEF DAILY / WEEKLY ACTIVITY

The following is a summary of weekly activities in the first 6 weeks that have been done during the internship at Envilab Sdn Bhd (Johor) where the tasks are many related and repetitive for every 16 weeks or more. Student is required to write down all activities performed each day at their industrial training place in a log book. Each day during the internship, student is able to acquire activities based on their own knowledge or through observation. Through experience and observation, student should make notes to be written in a log book and also to remember and apply knowledge. Each week, the log book is handed over to my industrial training supervisor, Mr. Hafiz for inspection.

1st Week – 2nd Week

Date	Weekly Activities	Date	Weekly Activities
1/3/21	-Do Coagulation and flocculation process by using jar test	8/3/21	-Do filtration process and aeration treatment on the sample
2/3/21	-Key in the data to make IECS report	9/3/21	-Key in the data result for IECS report
3/3/21	-Review study of nickel removal -Do aeration treatment on the raw effluent to test COD changes	10/3/21	-Do resin filter to treat whether the resin used can remove nickel or not
4/3/21	-Adjusting the pH and do chemical treatment on the sample by adding polymer until notice the flocs that formed	11/3/21	-Do the research and study about Recycling Technology for Waste Ferric chloride
5/3/21	-Do filtration process to remove the sludge from the sample -Key in the data result for IECS report	12/3/21	-Observe the parameter of carbon oxygen demand (COD) by using aeration treatment for each sample



(a)



(b)



(c)

Figure 5. (a) Coagulation and filtration process; (b) Research paper; (c) Aeration Treatment

3rd Week – 4th Week

Date	Weekly Activities	Date	Weekly Activities
15/3/21	-Learn in more detail of how to use autocad software through company's plan layout	22/3/21	-Make a report of job method statement (JMS) for repair concrete
16/3/21	-Do carbon filter to test whether the carbon used can remove nickel or not in each sample	24/3/21	-Key in the data results and do the discussion/conclusion for IECS report
17/3/21	-Do research on inspection and testing plan (ITP) for tank/surface cleaning (Quality Control Plan)	25/3/21	-Do correction on job method statement (JMS) by doing more research on repair concrete
18/3/21	-Study how to make Quality Control Form	26/3/21	-Read article/journal on method statement for pipe welding hours -Composite the samples
19/3/21	-Do aeration treatment to identify whether different volumes of sample affects the COD parameter through aeration testing	29/3/21	-Do job method statement (JMS) for pipe welding works



(a)



(b)



(c)

Figure 6. (a) Autocad software of company's plan layout; (b) Water analysis worksheet to key in the data results for IECS report; (c) Carbon filter in lab scale

5th Week – 6th Week

Date	Weekly Activities	Date	Weekly Activities
30/3/21	-Composite the samples -Printing the IECS reports	6/4/21	-Binding the Written Notification under Regulation 4 of the Environmental Quality (Industrial Effluents) Regulations 2009
31/3/21	-Do resin filter to testing on removal nickel from the raw sample	7/4/21	-Do the Industrial Effluent treatment System (IETS) to design the desired treatment tank of an industry
1/4/21	-Make some solutions by mixing water pipes and powdered carbon	8/4/21	-Do the Industrial Effluent treatment System (IETS) to design the desired treatment tank of an industry
2/4/21	-Shaking some 100ml raw samples to notice the bubbles that is present that represents the characterization of waste sample that can affect significant parameter	9/4/21	-Do the Industrial Effluent treatment System (IETS) to design the desired treatment tank of an industry
5/4/21	-Heating each waste sample to notice whether the bubble is present or not (To know the optimum dosage of antiform that can be used to avoid the presence of many bubbles	12/4/21	-Key in the data results and do the discussion/conclusion for IECS report



(a)



(b)



(c)

Figure 7. (a) IETS activity in an industry; (b) Written Notification; (c) The bubble is present on the sample

4.4 DESCRIPTION OF TASK ASSIGNED

While at Envilab Sdn Bhd, I was assigned in a team under the Project Unit until the last day of industrial training. The unit consists of the head of the unit, Mr. Abdul Hafiz bin Zakaria, CS Lim (Sr. Env. Engineer), KB Choo (Environmental Engineer), Mukhlis J (Environmental Engineer) and Nurul Atikah binti Zainal (Environmental Engineer). Among the scopes of work performed in this unit include:

- I. Wastewater Treatment
- II. Distillation Laboratory
- III. Industry Effluent Treatment Study, IETS

- I. Wastewater Treatment

As is known, chemical treatment or called tertiary treatment that can be more broadly defined as "treatment of wastewater by a process involving chemical treatment". Chemicals used during wastewater treatment in various processes have helped speed up disinfection. Chemical treatments that induce these chemical reactions are referred to as chemical unit processes and are used together in biological and physical purification processes to achieve various water standards. Intended special chemicals such as chlorine, hydrogen peroxide, carbon and others act as disinfectants, cleaning as well as assisting in wastewater purification in treatment facilities. However, there are several types of different chemical unit processes including chemical coagulation, chemical precipitation, chemical oxidation, chemical neutralization, chemical adsorption, precipitation and flocculation.

In industrial training, the company often exposes this chemical treatment process and also trains the student how to do it properly. Project unit has also used Research and Development, R&D platform on various types of wastewater effluent samples obtained to study, which I was exposed and assigned in this activity. The company prioritizes product quality and the accreditation given to them and clients. Starting from a sample of raw effluent that has been obtained from the client, the sample will then be pre-arranged by the student. After that, a number of raw waste samples will be sent to the laboratory for analysis representing the analysis before treatment and the remaining balance will be used for further treatment, i.e. chemical treatment.

For this chemical treatment, in the neutralization process, student will first add chemicals into the raw sample with the aim of adjusting the pH of the wastewater involving the addition of acid (to lower the pH) or alkali (to raise the pH) depending on the initial pH of the influence by

looking at the readings on the pH meter. The chemicals used are Sodium Hydroxide, NaOH or Hydrochloric Acid, H₂SO₄. Typically, the mentor asks the student to ensure the pH of the effluent sample needs to reach pH 6 to pH 7 by using available chemicals before being treated. This is intended to allow the chemical treatment to run smoothly. Next, the student will be guided by a mentor, Miss Atikah to perform a chemical coagulation process and then chemical flocculation on the samples through jar testing. The polymer is incorporated into the sample which acts as a positively charged coagulant that will reduce the negative particle load present in the litter sample. This causes the free particles to form larger groups, namely flocs. It can also reduce the carbon oxygen demand, COD in wastewater to bind sludge together. The student is trained to determine how many droplets of polymer into the sample with the appropriate quantity so as to form the desired floc. This coagulation dose will affect the effectiveness of the force and the duration of a particular mixing. The formed floc will react with the positively charged mixture in this sample and then neutralize the group of particles until it becomes a larger group.

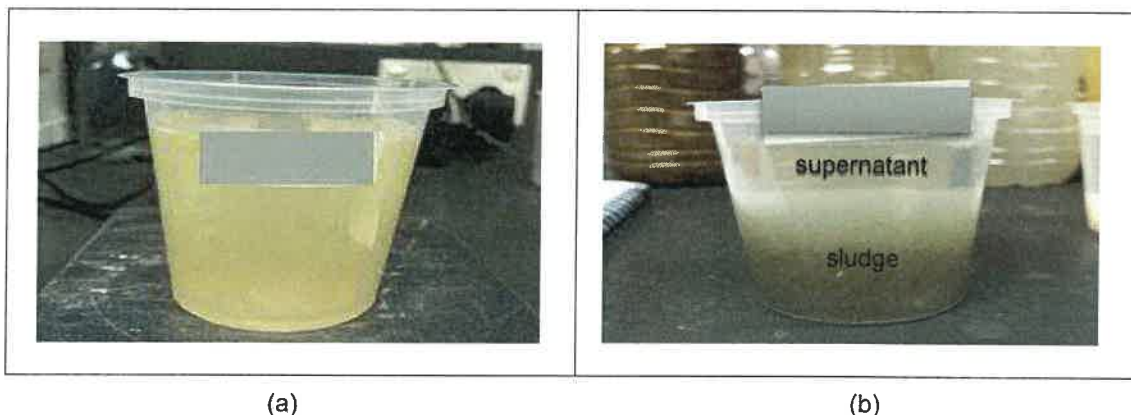


Figure 8. (a) Untreated Raw Effluent (Before); (b) Treated Effluent (After coagulation & flocculation).

Then, the student will also filter the mixture through a filtering process using filter paper. It is intended to remove the floc from the mixture. Once the sample is filtered, some measurements will be taken from the filtered sample and then will be sent to the lab to study the results of the parameters involved such as carbon oxygen demand, inorganic materials that exist and others. A comprehensive study is conducted on wastewater treatment based on important client parameters to identify the most qualified approach to comply with the standard limits set under the Environmental Quality Act 1974 (Industrial Effluent) Regulations 2009. Miss Atikah also taught the student how to fill in the analysis instruction sheet before the sample is sent to the lab, which is a form that needs to be filled out to differentiate the available samples so that

the lab is not confused. This is because the samples obtained by the company are many and different from different clients.

Figure 9. Example of Analysis Instruction Sheet

However, there are also cases where after chemical treatment is done on the partially treated sample and it is usually the last treatment step before being analyzed to the lab, the student will insert a few scoops of powdered activated carbon into partially treated effluent and then pass the sample into a carbon filter, which is an activated carbon technology, which has a small particle size as a high performance absorbent to remove harmful contaminants (hard water minerals) as well as microbial contaminants such as bacteria in the sample. Resin treatment is also one of the chemical processes performed on the effluent sample to remove dissolved ion pollution from wastewater and at the same time for water purification. The selections of resin used in the filtration columns is based on the type of contaminants that need to be treated. Among the types of resins used by envilab are anionic, cationic, mixed-bed resins and others which the student will run the sample little by little into the selected resin and finally analyzed to the lab or either proceed to further treatment.

In biological treatment or known as secondary treatment, it is one of the treatments required also by Envilab on effluent samples. Large amounts of solutes and colloids still contained in industry effluent samples need to be removed before disposal. Therefore, biological treatment will help to change the solute or particulate matter into larger particles thus making it easier to be removed during the separation process. If the raw wastewater sample received initially contains excess oil or solid, this sample must be treated first by the student before biological treatment either through the acidification process by dripping a few drops of sulfuric acid, H_2SO_4 into the raw sample until the oil layer is visible or by means of heating where the student will put the raw wastewater into the laboratory water bath with a temperature of $70\text{ }^{\circ}\text{C}$ for half an hour. Then, the formed oil layer will be separated through a separation process

using a separatory funnel. Envilab places great emphasis on this pretreated because the oil and suspended solids contained in the raw sample cannot be treated in the biological treatment system thus can negatively affect the treatment results.



Figure 10. Oil layer visible

The effluent sample will then be completed in aerobic treatment by the student and guided by Miss Atikah. Biological treatment in which microorganisms such as algae, fungi or bacteria get rid of suspended solids in wastewater treatment under aerobic conditions. After the initial pH is measured on the sample, the student will measure some quantity from the raw sample and separate it as raw wastewater sample where no treatment is done on the sample to be sent to the lab representing the results before treatment while the rest will be used in biological treatment. Aeration treatment is introduced by the company to the student which also covers one of the biological processes. From the remainder of the sample, the student will supply oxygen into the sample using an aerator for a set number of hours. If the set aeration period is 5 hours, then students need to set a time so that they can stop the aeration process on the wastewater sample from running after 5 hours.

Although oxygen consumption is not limited to wastewater capacity, but the capacity of aeration systems is limited in terms of oxygen transfer. Therefore, the student has to control the incoming gas air either not too strong or too slow and the student will find that bubble ventilation is produced during aeration where bubbles are produced by compressed air passed through plastic aerator tube. Sufficient dissolved oxygen is channeled so that the bacteria present in it can treat and stabilize the wastewater as soon as it causes maximum aerobic biodegradation of organic matter to occur. This treatment will also transfer oxygen from the gas phase into the water called gas absorption or oxidation to oxidize the iron or manganese contained in the wastewater sample. Bacteria present in effluent samples will decompose

carbon-containing organic matter to form carbon dioxide and water with the help of oxygen supply. This air removal can also get rid of ammonia, NH_3 effectively as well as remove unwanted substances in the wastewater. Biological blocks or sludge mentioned by bacteria during aeration treatment will be screened after the aeration system is finished using filter paper to remove this group of “active sludge” from the sample. The active sludge flux produced has helped increase the decomposition rate of wastewater contaminants.

The parameters of carbon oxygen demand, COD and biological oxygen demand, BOD are parameters that are often observed on industrial effluent samples by Envilab. This parameter must reach a reading according to the standards set by the company itself. These parameters are also closely related to the action of existing microorganisms. It is important for wastewater specialists to understand the presence or absence of these biological organisms because they also generally exhibit the characteristics of certain bodies of water. Too high a concentration of COD and also BOD is not good because it can reduce the concentration of dissolved oxygen in the sample. Aeration has treated the samples quickly to address this prevailing problem. Usually, the raw effluent after aeration is made will be sent to the laboratory for its parameters to be analyzed but the student has also been taught how to measure COD reading after the,dsj[[c treatment is done on the samples.

Mr. Mukhlis has shown a demo one by one to the student of how the COD test is implemented using the COD test kit. By using the effluent sample that has been treated, the student has the opportunity to use the COD test kit by inserting a few drops of the sample into each test tube. If it achieves the desired color change, the sample will then be pre-heated using a laboratory test tube dry block heater for a few minutes before taking the COD reading through a spectrophotometer.



Figure 11. Spectrophotometer

Usually, the COD test kit used has its own range. Therefore, the Envilab will select the range that suits the load of the COD test kit. If the results of the analysis that come out state that the measured COD parameters are above the set standard, a dilution process will be made on the sample. Mentor also showed the student a demo of how dilution is made using distilled water to reduce the solute concentration in the sample. How many times the dilution is made depends also on the volumetric flask that will be used by the mentor. For example, the mentor had used a volumetric flask that had a volume of 50 millimeters and instructed the student to make a dilution of 10 times, so the student would take 5 millimeters from the raw sample to be diluted. 5 millimeters of raw sample will be placed together with distilled water into a volumetric flask with a volume of 50 millimeters. After dilution is completed, the student will test the COD samples that has been diluted earlier through the COD test kit. Then, the student has to re-multiply the COD reading displayed on the spectrophotometer by how many times the dilution is made to get the actual COD reading of the sample. With this dilution process as well, it allows the spectrophotometer to detect COD sample readings easily if the company lacks a high range COD test kit.

II. Distillation Laboratory

Because the company consists of office and laboratory only, the distillation process performed on the sample will usually be done in the lab. The mentor has shown the correct way of arrangement using the distillation apparatus to the student before starting it. Samples to be distilled after chemical treatment are usually intended to analyze the parameters of carbon oxygen demand and biological oxygen demand. Through this distillation process, the organic compounds contained in the treated sample will be identified through its boiling point and can be purified by separating the compound from the material that does not evaporate or less evaporates. With the remainder of the treated sample, the student will measure a few millimeters according to the mentor's wishes and then put it in a thermos to the correct level for distillation. During the distillation process, the student should constantly monitor and control the temperature on the thermometer so that it always reaches a temperature of 100 °C, not too low or too high than that temperature.



Figure 12. Distillation process in lab scale

The student should also ensure that there is no excessive foam is on the surface of the sample being distilled as it can interfere with the resulting hot steam to condense. If the intended foam is present, the student is asked to place a few drops of antifoam into the sample being distilled to soothe the bubbling foam. This can also pose problems when measuring the height of the liquid and cause it to tend to overflow if the presence of the foam is left during distillation. Therefore, antifoam is useful for company to speed up the process as well as the availability of equipment of a process. In addition, there is also a distillation process made on raw samples by the student with the guidance of the mentor to observe the presence of foam on the surface of raw wastewater sample being distilled and identify the optimal number of antifoam drops to show the least foam on the sample surface. The presence of too much foam determines the growth of bacteria as well as the high floatation of dirt (waste) on the sample. Finally, after the distillation process is completed, the student will take the final result of the distillation and send it to the lab to be analyzed by the chemistry lab.

III. Industry Effluent Treatment Study, IETS

Because the company is an environmental consultant, the Industrial Effluent Treatment System (IETS) is also one of the company's job scopes. Staffs of the Project Unit especially often go out to the site to serve in this IETS to ensure that another processing industry in accordance with the laws that have been set as referred to in the Malaysian Environmental Quality Act, 1974 known as Environmental Quality (Industrial Effluent) Regulations 2009. The site in question is a wastewater treatment plant (WWTP) belonging to a processing industry (client) who wants to get environmental services from the company. The IETS made by Envilab includes designing facilities that also include effluent collection systems based on

Industry Effluent Characterization Study (IECS), identifying the cause of a problem that arises in wastewater treatment management, and improving industrial effluent treatment plants such as treatment tanks used to reduce the industrial effluent capacity of a plant that can cause pollution.

The company will conduct this Industrial Effluent Characterization Study (IECS) for three days according to the day arranged by the factory (client) itself where the raw effluent samples are collected from the sampling location or called sampling activity. The study was conducted during the factory operating hours because the samples were collected according to the client's specified time and sample point. The samples collected were without dilution from other water sources. The effluent samples to be collected by the company will be analyzed on the parameters as specified under the Environmental Quality (Industrial Effluents) Regulations 2009.

Prior to the site, the mentor will bring some empty plastic bottles to insert the raw effluent sample into it during the sampling point and bring some measuring tools to perform in-situ measurements at the site later such as pH meter, COD test kit and others. In-situ measurements will be performed on pH, temperature ($^{\circ}\text{C}$) and flow rate (m^3/hour) on the raw effluent sample for the three-day period by the mentor herself. While at the industrial location (client), the mentor has instructed the student to stay at one checkpoint where the student is asked and taught to measure the depth of raw effluent coming out of the drain at the checkpoint while the mentor will be at another checkpoint to collect raw effluent samples that comes out earlier using plastic bottles that have been brought.



Figure 13. Raw Effluent from inside the drain

The raw effluent will then flow into a tank for further treatment. Prior to that, the mentor had measured the area of the drain using a measuring tape. The purpose of measuring the depth of the raw effluent sample coming out of the drain is made to know the flowrate of the raw effluent sample that will enter the treatment tank in order to design the desired tank. So, the area of the drain that has been measured before will be multiplied by the depth of the raw effluent sample coming out of the drain to get the volume of the wastewater sample. Flowrate wastewater that enters the old tank helps the work to improve the new tank that is suitable for the factory (client).

5.0 EXPERIENCE GAINED

First, there is a lot of experience to be gained during industrial training. One of the experiences I gained was by doing all the relevant tests on my own wastewater treatment with the supervision of a mentor. For example, through chemical treatment tests for wastewater sample, biological treatment tests for wastewater sample, analyzing COD results using COD test kits, creating IETS activity in an industry and more. Apart from that, I also get a lot of beneficial training from companies such as QC Induction, Safety Training, Report Training and so on. Furthermore, be able to learn how to work and manage the R&D room as well as the laboratory itself such as, checking the condition of the laboratory, preparing equipment before the test is conducted, checking important documents and doing interesting work with other departments. I also know how to make a standard report which is an important part of the company's performance which is the IECS report. In addition, it has improved my soft skills such as communicating with colleagues smoothly and making presentations in front of management. All the experience gained will make me more mature in the future as an engineer. I learned how to manage problems calmly and ask for help when needed. Finally, I was able to adapt to the new environment successfully and increase my confidence level while acquiring new skills. It is important that one must know how to take care of themselves while working and always be determined to do all the assigned tasks and realize that that is one of the responsibilities that should be borne by the student. Remember that nothing is free in the world and the learning process only produces a better person in the future.

6.0 CONCLUSION AND RECOMMENDATION

There are many lessons to be learned and taken, new knowledge has been gained from mentor and colleagues. They teach a lot about wastewater treatment process management and related chemical engineering. Upon completion of industrial training, student gain many valuable and meaningful experiences that will never be available elsewhere. Project Unit is one of the important departments at Envilab to test and certify samples from clients. There are many skills and insights that student acquire throughout the course of industrial training.

Taking responsibility is one of the important lessons I learned. Responsibility is one of the indispensable qualities in any workplace. This is because when there is an incoming project, there must be an engineer taking on the project, so the responsibility borne by the engineer is very big because all decisions, mistakes and how to implement the project will be determined by the engineer. If the engineer does not know how to handle all these responsibilities, a given project will fail. In fact, student have been able to develop soft skills. The learning process will not end wherever we go. As human beings, I believe that we will never stop learning in life and the same thing happens while studying chemistry courses. There are many things that are not yet known to be revealed. For example, soft skills such as managing projects through R&D as well as those related to reporting, understanding problems faced by clients and more. As a student, there is still much to be learned and understood in this chemical engineering course and we cannot give up even if it is new and difficult to understand. We must always look for things to learn because the more we learn the more we don't know. Then, all the skills achieved will be very useful in the future.

During semester 5, the student has studied the subject of "Environmental Engineering" where many theories are applied within the scope of industrial employment. Industrial training helps student to better understand the theories I have learned. This is because all these theories that have been learned can be put into practice during industrial training. Practicing theory is essential to developing professional skills and a better understanding of real -world problems. For example, the student learns theories about the processes involved in wastewater treatment. But the student did not understand its application. During the industrial training, student can try to do it in more detail, in addition to the opportunity to see for themselves the wastewater treatment plants performed while creating the Industrial Effluent Treatment System (IETS) in the client industry. As a result, the student has a better understanding of the wastewater treatment made.

The knowledge gained from industrial training is one of the objectives that show that industrial training is successful. Respecting others is also something most students learn. In training, it doesn't matter if you take what course, there is always someone who excels and has a lot of experience and knowledge than you. Therefore, the reason why industrial training is needed is to provide new experience, knowledge and soft skills to students. Many new skills can be polished from day to day such as communication skills as it is one of the most important things a person must possess. Then, when someone makes a mistake or an accident, we need to think about how to help them overcome the problem because everyone has their own strengths and weaknesses and as in a team, it is our responsibility to help each other. In addition, the student also learns how to process problems and find a way out through problems and discussions with staff because more brains means more knowledge and ideas can be conveyed. Envilab Sdn Bhd is a company that is very suitable for Chemical Engineering diploma students to do industrial training. This is because there are engineers, accountants and even technicians in the company. There is a lot of knowledge that can be gained from them. In addition, the company specializes in water and environmental management. Finally, I am very grateful for the opportunity to work at Envilab Sdn Bhd. Therefore, I thank Envilab Sdn Bhd (Johor) for accepting my application to work at the company. Hopefully the knowledge I gained in the company can be taught and passed down in the future.

For recommendation, the company should think of and prepare a schedule of weekly assignments that need to be done by the internship students themselves with the supervision of a mentor or supervisor in advance so that students are always prepared before undertaking the tasks that will be given directly. I recommend to faculty also should gather more companies available for internships with updated contact information so that students can approach the HR department easily. While I was looking for a company to do industrial training, I found out that many of the contact numbers and emails for companies provided by the faculty were outdated and some contact lists no longer even worked for the company. Also, contact lists and emails for companies displayed on the internet or websites are for internal use only. For public use, we can call but sometimes fail to speak to anyone relevant because we do not know the direct incoming dial number. For email, I am also facing the same problem as shown on the internet of not being able to send email and its address is only for internal use. Moreover, I think the faculty should plan a meeting to invite seniors who have already undergone industrial training and share skills in applying internships to juniors. This can help the juniors to learn the techniques of preparing a resume and choose a suitable industrial training company.

7.0 REFERENCES

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PERSONS

- 1) Mr. Mohd Abdul Hafiz bin Zakaria, Johor Branch Manager, Envilab Sdn Bhd
- 2) Miss Nurul Atikah binti Zainal, Environmental Engineer, Envilab Sdn Bhd (Johor)