

# INDUSTRIAL TRAINING REPORT

## CHE353

GROCHEM (M) SDN. BHD.

### PREPARED BY

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## 1.0 INTRODUCTION

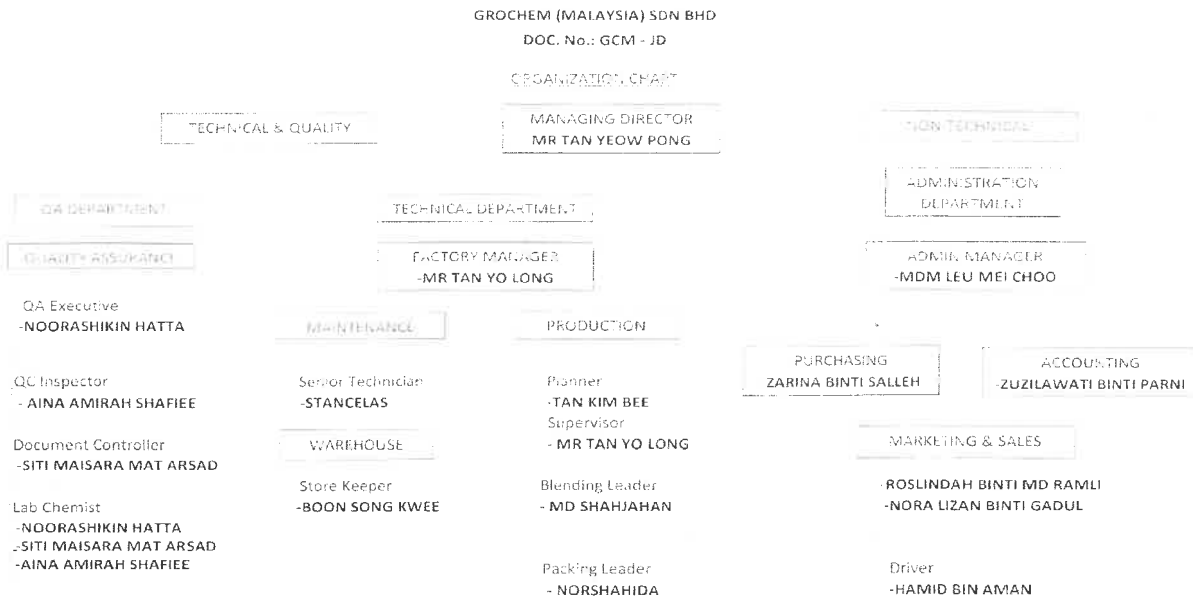
Industrial Learning is final subject of the Chemical Engineering Diploma program. This subject is intended to be a learning substrate for students to be able to be exposed to, as well as engage with the typical industrial cases and problems of a chemical engineering-related company. This results in a proto-orientation for the challenges and the work of their future workplace, thus in turn providing a smooth transition from an input based mindset to an output one. The total point for this course is 7.0, a passing grade allows the student to procure their Diploma, given that there are no more subjects left to be repeated.

My industrial learning was conducted in a cosmetic company called Grochem (M) Sdn. Bhd, located in Seri Alam, Johor Bahru. The company is a contract manufacturer that has a systematic way of conduct and learning possibilities for Chemical Engineering students. The flow of the company's production follows a typical industrial process, from the receive of order, to finally the production with steps in the middle to ensure the highest quality product is produced, as well as products that are satisfactory to the contractor. The daily activity of the company starts with a simple reading of important legal texts, to be legally grounded for my own and the other persons' safety, followed by participation in important steps in the production flow, such as sample creation and quality control, as well as MSDS review.

All these activities educated me in the typical industrial process and the necessary skills to be involved in a chemical based company, outside of the syllabus that I learned during my chemical engineering program.

## 2.0 ORGANIZATION CHART AND HISTORY OF COMPANY

### 2.1 ORGANIZATION CHART



*Diagram 2.1 Grochem (M) Sdn. Bhd. Organization Chart*

### 2.2 HISTORY OF THE COMPANY



*Diagram 2.2.1 The Front of Grochem Office Building*

Grochem (M) Sdn. Bhd is a Good Manufacturing Practice compliant company, mainly focuses on the manufacturing of cosmetic and household products. The company was

established in October 1987 in Tampoi, founded by Mr Tan Yeow Pong, the current Managing Director of the company. The company expanded its operation to a bigger warehouse where it is based currently, which is Seri Alam, Pasir Gudang in order to increase productivity and output. The company has a stable and strong web of connections across Malaysia as well as internationally, a sign that the company is occupying its niche as a contract-manufacturer wonderfully. A contract-manufacturer is a form of commission-based business, which is making products in accordance to the request of the customer. The specificity as well as the adjustment of the product will be given by the customer. Upon approval from the customer, the product can be mass produced according to the ordered quantity.

A smooth operation of a contract-manufacturer of cosmetic and household products needs several subgroups of staff members, each specializing in a certain task. The two distinct subcategories of the operation of the company is the Technical and Quality department, and the Non-technical department. The Technical and Quality staffs oversee the production, from quality control by the Quality Assurance Department to Technical Department which is the logistics, maintenance and production. The Non-Technical staffs mostly oversee the transactions made between companies, from purchasing, sales to marketing.

### 3.0 PROCESS FLOW

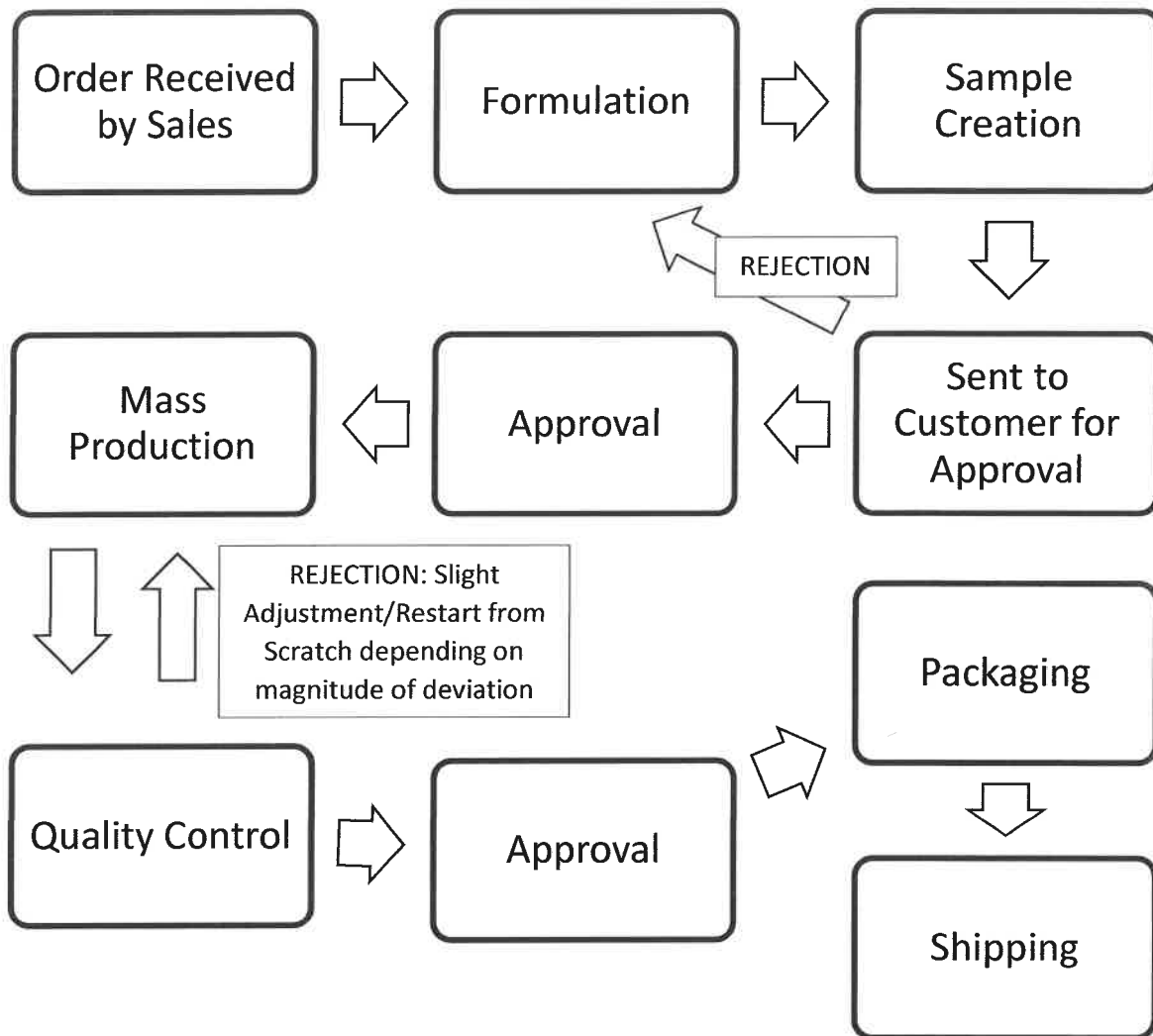


Diagram 3.1: Flow Chart of Grochem's Operation

#### 1) Order Received by Sales

The creation of a product by the company starts with an order received by the sales department. This is where the commissioned product is considered for production. The product's details and purpose is set in this stage, whereby the customer requests certain properties for the product to be made. These properties are considered for the formulation stage

### *7) Packaging*

Once approved, the products are ready to be packaged into their respective packages and shipped off. The packaging service is often provided by Grochem with the existence of a packaging branch in the production line. Most of the time, the boxes, stickers and containers are provided by the customer for the Grochem packaging staff to assemble and pack.

### *8) Shipping*

Once everything is set, the shipping process starts. This depends on the customer, whether to physically take the products themselves or by using Grochem's own driver and truck to deliver to the customer's location. Sometimes, international customers will require the products to be shipped via cargo ships.



## 4.0 DAILY ACTIVITIES

### STUDENT WEEKLY PROGRESS REPORT

Effective from	to		
22/3/2021	26/3/2021		
Day	Description of practical work/experience	Details of projects	
22/3/2021	1	<ul style="list-style-type: none"> <li>Tour of the company</li> <li>Introduction to staff</li> <li>Introduction to site</li> <li>Introduction to manufacturing area</li> </ul>	
23/3/2021	2	<ul style="list-style-type: none"> <li>Reading of safety manuals</li> </ul>	General tour of the jobs that exists in the company
24/3/2021	3	<ul style="list-style-type: none"> <li>Reading of safety manuals as well as instruction card</li> <li>Simulation for removal of waste products &amp; recycling</li> <li>GMP Good Manufacturing Practice</li> <li>Importance and manufacturing species &amp; processes</li> </ul>	
25/3/2021	4	<ul style="list-style-type: none"> <li>Day 4 of reading</li> <li>GMP</li> <li>Proper handling of raw materials as well as products</li> <li>Good hygiene and job methods</li> </ul>	
26/3/2021	5	<ul style="list-style-type: none"> <li>Day 5 of reading</li> <li>GMP avoid cross-contamination</li> <li>GMP</li> <li>Hazardous handling and materials</li> </ul>	
Type(s) of skills obtained			
<p>Obtained the knowledge of proper manufacturing practice</p> <p>Learned the PPE and safety to avoid danger to workers &amp; customers</p>			

Diagram 4.1 Student Weekly Progress Report Week 1

## STUDENT WEEKLY PROGRESS REPORT

Effective from 5/14/2021 to 9/14/2021

Day	Description of practical training experiences / details of projects
5 11	<ul style="list-style-type: none"> <li>• Considering the manufacturing of <u>V-bone A</u> <del>cast iron</del></li> <li>• Day 1</li> </ul>
6 12	<ul style="list-style-type: none"> <li>• Considering the manufacturing</li> <li>• Day 2</li> </ul>
7 13	<ul style="list-style-type: none"> <li>• Considering the manufacturing</li> <li>• Day 3</li> </ul>
8 14	<ul style="list-style-type: none"> <li>• Considering the manufacturing</li> </ul>
9 15	<ul style="list-style-type: none"> <li>• <del>Considering the manufacturing</del></li> <li>• <del>Considering the manufacturing</del> Learning about quality control</li> </ul>

Type of skills obtained:  
 Learned the process flow of creation of geometric forms as well as the properties relating to quality control.

Name of mentor/supervisor: \_\_\_\_\_

Comments: \_\_\_\_\_

Signature of mentor/supervisor: \_\_\_\_\_

Diagram 4.3 Student Weekly Progress Report Week 3

## STUDENT WEEKLY PROGRESS REPORT

Effective from

22/4/2021

to 16/5/2021

Day	Description of practical training experience / Details of projects
12	<ul style="list-style-type: none"> <li>- Revising reaction of perfume</li> <li>- mixing of ethanol with a fragrant ester.</li> </ul>
16	
13	<ul style="list-style-type: none"> <li>- Distilling packaging of perfume.</li> </ul>
17	
14	<ul style="list-style-type: none"> <li>- Distilling reaction of Purple lemon.</li> </ul>
18	
18	<ul style="list-style-type: none"> <li>- Given time to write report</li> </ul>
19	
20	<ul style="list-style-type: none"> <li>- &amp; sniffing on sample container.</li> <li>- The items used</li> <li>- How much</li> <li>- etc.</li> </ul>
22	

Types of skills obtained

Learned the making of the commercial perfume.  
Also seeing the mass production of purple lemon.

Name of mentor/supervisor

Contact no.

Signature of mentor/supervisor

Diagram 4.4 Student Weekly Progress Report Week 4

## STUDENT WEEKLY PROGRESS REPORT

Effect no form

19/11/2021

23/11/2021

- 19 Description of product training experience - Details of project
- 20 • Sample creation of shaving gel
    - ingredients identified
    - adapted to avoid irritate according to pH
    - final product sample put in a container
  - 21 • Shaving sample created by:
    - color
    - pH
    - viscosity
  - 22 • Sample creation of shaving foam
    - ingredients identified
    - white and soft
    - avoid ingredients causing color
  - 23 • Study of basic ingredients in cosmetic product
    - surfactants
    - oils
    - thickening agent
  - 24 • Study of basic ingredients in cosmetic product
    - humectants
    - stabilizers
  - 25

Types of skills obtained

around the field Dept in the creation of a product as well as the details of the ingredients used.

Name of mentor/supervisor

Comments

Signature of mentor/supervisor

Diagram 4.5 Student Weekly Progress Report Week 5

## 5.0 PROJECT

The precondition to working in a chemical-based company, especially that of cosmetic and household variety, is the knowledge of the legality and safety of the materials used. This is due to the public nature of the product, wherein human beings are actively exposed to it, that can have massive ramifications if the limits of human resistance are exceeded. Thus, certain limits and threshold are imposed onto companies that produces such products in order to ensure catastrophic damage relating to human lives are averted. Thus, my first task at the company is to read relevant manuals and guidelines in order to be knowledgeable at the first principal level. The documents will be described in brief.

### 5.1 Reading safety legal acts and guidelines

#### 5.1.2 Occupational Safety and Health Act 1994 (OSHA 1994)

One of the documentations that serves as the basis for any chemical production is the Occupational Safety and Health Act 1994 (OSHA 1994) which provides a guideline for chemical production to ensure safety, health and welfare of persons when dealing with chemicals. This document covers the legal ramification of not following the guideline, as well as the specifics about how to ensure a workspace is safe. The document details about the requirement of keeping records of hazardous chemicals, training of individuals as well as the person exposed to the chemicals. The document also gives information about hazard symbols and labelling for the knowledge of the person handling a certain type of chemical.

#### 5.1.3 Industrial Code of Practice (ICOP)

The Industrial Code of Practice (ICOP) is a document released in 2014. The document details extensively regarding guidelines for the compliance of the requirements of established Regulations, which is the Regulations 2013, which was gazetted on 11 October 2013. ICOP consist of four main parts, which are; Part 1: List of Classified Chemicals which is a list of prominent and often used chemicals and their hazard classification and labelling, as well as their CAS numbers which are easy identification numbers, Part 2: Chemicals Classification, which details how certain chemicals are classified Part 3: Hazard Communication: Labelling and Safety Data Sheet which details what is necessary in a Safety data sheet as well as labelling dimensions and properties, and Part 4: Confidential Business Information which are details which can be exempted from the main MSDS.

#### 5.1.4 Guideline for Control of Cosmetic Products in Malaysia (GMP)

Good Manufacturing Principles is part of the Guidelines for Control of Cosmetic Products in Malaysia. This guideline is published by the National Pharmaceutical Regulatory Agency (NPRA), which is part of the Ministry of Health, Malaysia on 1<sup>st</sup> January 2008 and was revised on 1<sup>st</sup> February 2017. The purpose of this document is to convey the reference as well as to be the guideline for cosmetic product manufacturers. Since cosmetic products are defined as substance intended to be placed in contact with various external parts of the human body (epidermis and oral area), the preparation, ingredient, and quality control of the product is paramount to avoid any risk of injury or death. This guideline sets itself to prepare the manufacturer to minimize these risks.

Good manufacturing Principles is the most important as it is a set of principles that is made to be a guide for manufacturers to develop a system in accordance with it, resulting in high quality of product, avoidance of cross-contamination, and safe work environment. Principles such as keeping areas clean, cleaning drums and reactors after, and the separation between the workers for quality assurance and factory workers are important in assuring the highest quality product, bereft of cross contamination and are safe for application.

## 5.2 Sample Creation

One of the most important tasks I was assigned with was the creation of small amount of sample of a commercial product. Sample creation is important in the line of work of chemists as to ensure that the product that will be mass produced will have the proper formula and quality as desired by the customers. In order to achieve this, small samples of around 100 ml are made under controlled lab condition and are shown to the customers and quality assurance to be inspected and commented upon for any change until the satisfied conditions are achieved. The sample creation process starts with a formula. This formula is given in the shape of a formula sheet.

FORMULA SHEET  
REVISIONS  
Rev. 0

**GROCHEN (INDONESIA) PTE. LTD.**  
**PRODUCTION FORMULA**

Product Name: Body Wash      Batch No:      Date:      Customer Name:      Volume:     

Code No:      Qty:      Date:     

Production Quantity:     

Plant/Production Section:     

Partic	Material	Unit	Weight	Volume	Percentage	Remarks
	Water	kg	100.00		100.00%	
	Surfactant	kg	10.00		10.00%	
	Preservative	kg	0.50		0.50%	
	Thickener	kg	0.50		0.50%	
	Perfume	kg	0.50		0.50%	
	Colorant	kg	0.50		0.50%	
	Conditioner	kg	0.50		0.50%	
	Moisturizer	kg	0.50		0.50%	
	Essential Oil	kg	0.50		0.50%	
	Salt	kg	0.50		0.50%	
	<b>Total:</b>		<b>116.50%</b>		<b>100.00%</b>	

**LABORATORY TEST**

Parameter	Specification	Result
Color		
Odor		
Viscosity		
Stability		
Phosphorus		

\* This formula is subject to change without notice. Please refer to the latest revision of this formula.

Diagram 5.2.1: Production Formula for Body Wash

From here, I was assigned to research each product and their ingredients. The ingredients serve different purposes; therefore, a knowledge of their usage is useful for any sort of remediations or changes in the formula for different purposes. The types of ingredients are separated into five different types. These are the solvent, which is the liquid basis for the other ingredients, surfactants or emulsifier, for the cleaning effect and to be able to create a miscible and foaming mixture, active ingredients which serves specific purposes such as exfoliant or anti-acne, preservative which increase the shelf life of the product and finally the thickening agent which makes the product applicable and able to be





lathered. These are the basis for almost all soaps and cosmetic products which can be manipulated to give different effects.

There were 5 different products I was assigned to make the sample of. These are cleansing gel, cleansing foam, cream base, shampoo and body wash. These products are made without any scents in order to teach me regarding the basics of these products and how they can be made into different commercially viable products by addition of different materials such as scents or active ingredients. 100 ml sample was created and mixed in the laboratory and are stored in small capsules.

### 5.2.1 Cleansing Gel

The Cleansing Gel is a scentless and colourless gel that lathers and bubbles with the presence of water. The product is anti-acne from the usage of sodium lauryl sulfate and salicylic acid, which is an exfoliant that slough off dead skin cells that promotes acne.

- Diethanolamine (Surfactant)
- Salicylic Acid (Active Ingredient)
- Allantoin (Thickening Agent)
- Sodium Lauryl Sulfate (Surfactant)
- Cocamidol Propyl Betaine (Thickening Agent)
- Kathon CG (Preservative)

### 5.2.2 Cleansing Foam

The cleansing foam is a pearlescent, opaque thick liquid. Its uses are similar to the cleansing gel, but with more foaming agent for the formation of thicker foam.

- Diethanolamine (Surfactant)
- Polyquaterinium (Active Ingredient)
- Sodium Cocoyl Isethionate (Emulsifier)
- Ethylene Glycol Distearate (Pearlescent Effect; color)

- Cocamidol Propyl Betaine (Thickening Agent)
- Kathon CG (Preservative)

### 5.2.3 Cream Base

The cream base is the basis of all cream product. It is an opaque white thick cream. The creation of cream product is split into two stages, one is the creation of two basis and finally the mixing of the two at the same temperature to create a miscible mixture. The failure to do so will result in a separated mixture that does not thicken.

- Diethanolamine (Surfactant)
- Glyceryl Monostearate SE (Thickening agent, Preservative, Emulsifier)
- Cetyl Alcohol (Active Ingredient)
- Steareth (Emulsifier)
- Disodium EDTA (Active Ingredient)
- Carbomer (Thickening Agent)

### 5.2.4 Shampoo

The shampoo is a pearly thick liquid, that is considered to be a harsher mixture applicable on the hair. The usage of phosphoric acid differentiates the shampoo from the cosmetic product that is used for the face.

- Diethanolamine (Surfactant)
- Sodium Laureth Sulfate (Surfactant)
- Cocamidol Propyl Betaine (Thickening Agent)
- Phosphoric Acid (Neutralising Agent)
- Germal 115 (Preservative)
- Formalin (Preservative)
- Disodium EDTA (Active Ingredient)

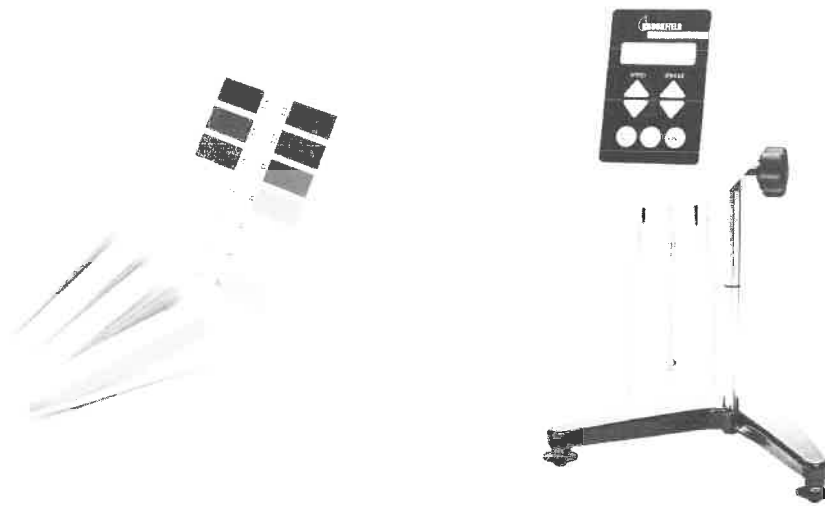
### 5.2.5 Body Wash

The body wash is a thick clear liquid that is usable to the body. The body wash is similar to the shampoo, being slightly harsher in comparison to products used on the face with the addition of phosphoric acid as well as salt.

- Diethanolamine (Surfactant)
- Sodium Laureth Sulfate (Surfactant)
- Cocamidol Propyl Betaine (Thickening Agent)
- Glycerol (Active Ingredient)
- Kathon CG (Preservative)
- Phosphoric Acid (Neutralizing Agent)
- EGDS 722 (Preservative)
- Salt (Thickening Agent)

### 5.3 Quality Control

Assurance of the production of top-quality products is predicated upon the quality and viability of the products. These are the backbone of the company, and thus, a failure to ensure that these base materials are of acceptable quality will be disastrous for the company's products and reputation. Thus, quality control is an important aspect of the production of cosmetic and household products.



*Diagram 5.3.1 pH Strip (Left) and Brookfield Viscometer (Right)*

The quality control is by using A sample of 500 ml is taken from each batch and tested according to the industry standards. This standard is the viscosity and pH. Viscosity is needed to quantify the proper thickness of the product to the satisfied standards, and pH is for the safety and effectiveness of the product, considering cosmetic products can harm the skin at pH values below or over its standard, and operates efficiently at different pH value. The viscosity is measure using a Brookfield viscometer meanwhile the pH is tested with a pH strip. The Brookfield viscometer operates by placing a liquid in the container, underneath a spindle. The spindle is applicable only under certain ranges of viscosity, depending on the design. The Brookfield viscometer measures the energy taken to complete a revolution under a certain speed. Secondly, the pH strip works by contacting a moist area of the subject on the pH paper, and the color compared with a color scale that corresponds to certain pH values.

## 5.4 MSDS Review

A Material Safety Datasheet is a document that brings concise and necessary information regarding a specific chemical. The company's MSDS is procured from the supplier of the raw materials to be given to the relevant staffs to be read. Malaysia uses a rubric laid down by CLASS 2013, which needs to contain the following sections to be considered valid.

### *Section 1: Identification of the hazardous chemical and of the supplier;*

- This details the name and supplier of the specific chemical

### *Section 2: Hazard identification;*

- This details the hazard Class which describes the magnitude of the specific hazard labeling. Pictogram which is the visual representation of the hazard statement of the material, Signal Word which shows the magnitude in a more direct manner e.g. Danger/Warning, Hazard Statement which is the category of hazard of the material, and finally the Precautionary Statement. Precautionary Statements splits into 4 parts which are the prevention methods to avoid any risk to health or environment, the Response which is the way to handle any release to mitigate risk to health or environment, Storage which states how to store certain product and finally Disposal which states how the material is to be disposed of.

### *Section 3: Composition and information of the ingredients of the hazardous chemical;*

- This section details the composition of the chemical and the specific chemical formula of the material.

### *Section 4: First-aid measures;*

- This section described the proper measures in case of an injury related to the product, such as contact, or consumption.

### *Section 5: Fire-fighting measures;*

- This section described the way to deal in case of a material-related fire occurs. Different material requires different way of extinguishing a fire formed out of said material. Therefore, proper instructions are paramount for the safety of individuals related.

*Section 6: Accidental release measures;*

- This section describes the way to deal with any accidental release. Certain materials can cause ecological ramifications, or toxic and flammable evaporations. Therefore, instructions are important in order to be able to handle such scenarios.

*Section 7: Handling and storage;*

- This section states how to store and handle the item. For example, in what types of container, tools to avoid release and danger and at what temperature and condition of the room that the material is being stored in.

*Section 8: Exposure controls and personal protection;*

- This section details the proper equipment that is necessary to be used when dealing with the chemical. For example, types of gloves, face masks, goggles, etc.

*Section 9: Physical and chemical properties;*

- This section details the physical and chemical properties such as boiling point, freezing point, vapor pressure, density, etc.

*Section 10: Stability and reactivity;*

- This section details the conditions, temperature and materials that needs to be given notice to avoid any reactions or to give information regarding the material's stability.

*Section 11: Toxicological information;*

- This section details the LD50 information and such to show the toxicity of the material.

*Section 12: Ecological information;*

- This section details the ecological ramifications and effect for the material's release into nature by showing the EC50 value, which are values that quantify the concentration that effects marine life.

*Section 13: Disposal information;*

- This section states how to dispose the material, such as specifics regarding where to dispose of the material.

*Section 14: Transportation information;*

- This section states how to transport the material, with regards to shipping and packaging condition appropriate to ensure safe transport.

*Section 15: Regulatory information;*

- This section details any other information of note that is not included with the sections above.

The review is important as the company goes through an auditing process with the involvement of DOSH and NPRA as a GMP complying company. This results in a rigorous reviewing process by the competent persons involved in order to evaluate the company's risk to health and their manufacturing practices. The MSDS is one of the most complicated aspect of this auditing process as the CLASS 2013 is newly enacted and many company does not follow this rubric. This is because of the nature of raw materials that comes from countries that does not use this classification rubrics. Therefore, each received MSDS needs to be reviewed to be considered satisfactory to be used.

## 6.0 CONCLUSION

In conclusion, my industrial learning was a resounding success. The knowledge and skills I received was undeniably important to my continuing chemical engineering career. The exposure I receive with regards to the nature of an industrial work flow, as well as the documents and legal necessity to the formation of a functioning and safe chemical company is thoroughly absorbed, forming a better chemical engineer candidate.

This experience solidified that the 5 semesters spent learning about thermodynamics, safety and chemistry were not in vain, in fact they were essential and useful throughout my industrial learning experience. Especially the knowledge taught regarding safety and health, which were vital for a cosmetic company. A lot of the vocabularies used in the work environment were easier to understand as I was primed with the proper workplace safety education.

Not only that, I experienced new acquaintanceship and even friendships that may last beyond my short 14 weeks. The early awkwardness seemed like only a bygone era, when strong friendships were born with fellow staff members. The experience taught me a lot about the nature of the workplace environment and the necessity of extroverted attitudes and thought processes, to be well-liked alongside being respected.

This industrial learning experience will be an experience that will stick with me throughout my journey into becoming a full-fledged chemical engineer in the knowledge and skill aspects, as well as the interpersonal aspects.