

UNIVERSITI TEKNOLOGI MARA

**A LITERATURE REVIEW ON POSSIBLE
INDUSTRIAL APPLICATIONS OF FATTY ACID**

SITI NOORBAIZURA BINTI ABDUL RAHMAN

Thesis submitted in fulfillment of the requirements for the degree of

Bachelor Eng. (Hons)

Faculty of Chemical Engineering

July 2017

CONTENTS

CHAPTER 1	10
INTRODUCTION	11
1.1 BACKGROUND	11
1.2 OBJECTIVE	14
1.3 PROBLEM STATEMENT	14
1.4 SCOPE AND LIMITATION	14
CHAPTER 2	16
LITERATURE REVIEW	16
2.0 INTRODUCTION	16
2.1 USES OF FATTY ACIDS IN INDUSTRY.....	18
2.2 SOURCES OF FATTY ACIDS.....	33
2.3 NATURAL SYNTHESIS OF FATTY ACIDS	36
CHAPTER 3	40
METHODOLOGY	40
3.1 Book and e-book	40
3.2 Article	42
3.3 Report.....	44
CHAPTER 4.....	42
4.1 Pharmaceutical Industry.....	43
4.2 Food Production Industry.....	44
4.3 Food Packaging Industry... ..	45
4.4 Soap and Detergents Industry.....	46
4.5 Cosmetic and Toiletries Industry.....	47
4.5 Textile and Leather Industry.....	49
4.6 Lubricant Oil Industry.....	50
4.7 Paints and Coating Industry.....	52
4.8 Rubber Industry.....	53
CHAPTER 5.....	63
5.1 CONCLUSION.....	63

5.2 RECOMENDATION.....	64
REFERENCE.....	69

CONTENT OF FIGURE

CHAPTER 1

FIGURE 1.1: The structure of lauric acid which chain of hydrocarbon that contains methyl group and carboxyl group at the end of the structure	10
FIGURE 1.2: Structure of saturated and unsaturated fatty acids.....	11
FIGURE 1.3: The combination of one unit of glycerol.....	13

CHAPTER 2

Figure 2 .1: The structure of lauric acid consist of methyl group at the end, and caboxylic group at the opposite.....	15
Figure 2 .2: Figure shows the different structure of monounsaturated and polyunsaturated fatty acids.....	16
Figure 2. 3: Capsule that contain fatty acids.....	17
Figure 2. 4: Soap that contain fatty acids.....	18
Figure 2. 5: The Antabax soap contain Etidronic acid.....	19
Figure 2. 6: Figure shows that steric acids (red box) have been use in cleanser cream.....	20
Figure 2. 7: Personal care that contain fatty acids.....	21
Figure 2. 8 : This Johnson Baby Lotion contain stearic acid.....	21
Figure 2. 9: Tomato sauce that contain fatty acids.....	22
Figure 2. 10: Ketchup contain saturated fatty acids.....	23
Figure 2. 11: Example of food products that contain fatty acids.....	24
Figure 2 .12: This strawberry jam contain citric acid.....	24
Figure 2 .13: Example of food products that contain fatty acids.....	25
Figure 2 .14: Gardenia bread contain unsaturated and saturated fatty acids.....	25
Figure 2.15: This Figure show the embedded resistor printed using ink-jet printed.....	28

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Fatty acid is along chain of hydrocarbon which consists of methyl group(CH_3) and carboxyl group (COOH) at the both ends of the structure. Natural fatty acids commonly have 4 to 28 carbon atoms, that usually in straight line with even number of hydrogen (“IUPAC Gold Book - fatty acids”, 1995). Fatty acid may come from animal and vegetable oils and fats. There are some fatty acid that can usually found such as stearic acid, palmitic acid and lauric acid. Fatty acids is being differentiate by its length, which are known as very long chain fatty acids, long chain fatty acids, medium fatty acids and short chain fatty acids. Very long fatty acids contain more than 22 carbons, long fatty acids contain 16 or more carbons while medium fatty acids have 8 to 15 carbons and short fatty acids contain less than 6 carbons.

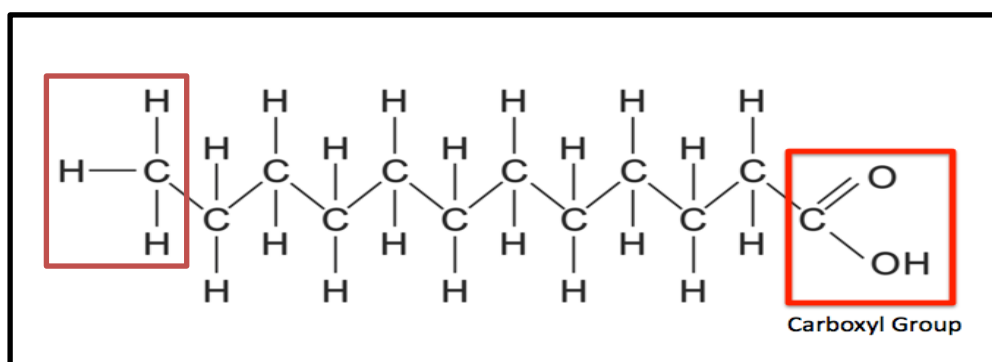


Figure 1.1: The structure of lauric acid which chain of hydrocarbon that contains methyl group and carboxyl group at the end of the structure. The carboxyl group (boxed red) is located at the end of the chain. (Garcia, 2016).

Fatty acids can be saturated or either unsaturated. Saturated fatty acids are containing straight line structure without branches. It is also contain maximum number of hydrogen atoms bounded to it. Because of saturated fatty acids only have single bond, each carbon has 2 atoms of hydrogen atom except for the last carbon that contain 3 hydrogen atoms ("Fatty acid", 2016). Table 1.1 listed example of saturated fatty acids

Unsaturated fatty acids contain at least one double bond between carbon atoms as it is lost one or more pairs of hydrogen from carbons chain. Unsaturated fatty acids include monounsaturated and polyunsaturated fatty acids. When the hydrogen is missing, the fatty acids structure will bend out of shape. Monounsaturated fatty acids are missing one pair of hydrogen , thus creating one double bound. Example is oleic acid. Polyunsaturated fatty acids are missing more than one pair of hydrogen, example linoleic acid ("Fats of Life Fat Basics - Fats of Life", n.d.). Table 1.2 listed example of unsaturated fatty acids.

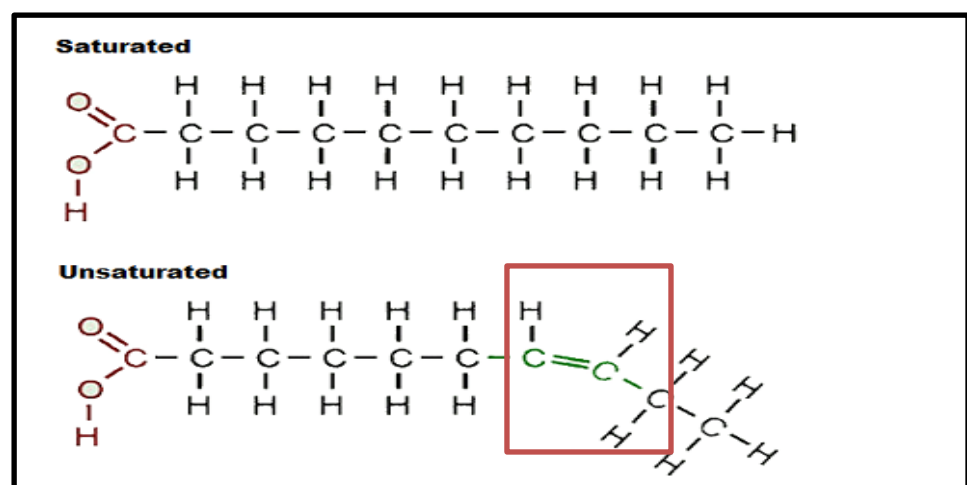


Figure 1.2: Structure of saturated and unsaturated fatty acids. The double bond (in red boxed) is happened in unsaturated fatty acids as the hydrogen is missing and causes double bond, thus the structure will bend out. ("TEXT: Biological Macromolecules", 2016).