

UNIVERSITI TEKNOLOGI MARA

**REDUCTION OF FREE FATTY ACID (FFA)
FROM CRUDE PALM OIL BY USING HIGH
AMPLITUDE SONIC WAVE**

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ABSTRACT

The amount of free fatty acid (FFA) in crude palm oil (CPO) is a parameter to determine a good quality in palm oil production. FFA is present as a consequence of cell damage in vegetable tissue during each process from harvesting until it can be processed into oil. Producing a high-quality CPO with lower than 5% of FFA required high cost, longer time treatment and at high temperature. Using the treatment from the ultrasonic can increase the quality of palm oil from the cavitation of the bubbles produced which creates the compression and decompression of energy. Comparison of various method of a magnetic stirrer, aerator and ultrasonic by using different parameters of solvent, temperature and time are studies. The results of using ultrasonic with the ratio of oil to solvent at 1:1.8 for ethanol and hexane solvent at the temperature of 45°C in 60 minutes give a significant result to reduce the FFA in low percentage. The removal of FFA and yield extraction from this study are 43.74% and 45.61%. The study concludes that the ultrasonic method can be applied as an alternative method for pre-treatment of CPO which reduces FFA below 5%.

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TABLE OF CONTENT

	Page
COORDINATOR’S CERTIFICATION	i
SUPERVISOR’S CERTIFICATION	ii
ABSTRACT	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENT	vi
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF SYMBOLS	x
LIST OF ABBREVIATIONS	xi
CHAPTER 1: INTRODUCTION	1
1.1 Research Background	1
1.2 Problem Statement	3
1.3 Objectives	4
1.4 Significance of Study	4
1.5 Scope of Research	4
CHAPTER 2: LITERATURE REVIEW	5
2.1 Free Fatty Acids	5
2.2 Palm Oil	6
2.2.1 Physical characteristics	7
2.2.2 Palm oil composition	7
2.2.3 Processing of CPO	8
2.2.4 Relation of CPO and FFA content	8
2.2.5 Storage and handling	9
2.3 Ultrasonic	9
2.3.1 Mechanism of ultrasound equipment	10
2.3.2 Ultrasonic on FFA	10
2.4 OFAT analysis method	11
	vi

CHAPTER 1:

INTRODUCTION

1.1 Research Background

The origin of fats is due to the component of triglycerides that appear solid at room temperature, whereas in liquid form it is referring to oil. In food pyramid systems, human needs fats as an essential nutrient with a certain amount because the body cannot produce on its own. The goodness of fats is becoming an alternative source of energy, helps in fat-soluble vitamin absorption especially for vitamins A, D, E, and K and insulate and maintain body temperature. However, according to the World Health Organization, total daily intake for fat should be not exceed 30% of total energy requirement.

Fats can be found in all plant and animal based and studies shows plant-based fats are better than the animal-based fats if it is compared for the monounsaturated fats. However, Campbell, (2017) claims mostly people simply assumed that all vegetable-based fats are good for them. There are three groups classification of fats which are saturated fatty acids, trans fatty acids and unsaturated fatty acids. The saturated fatty acids is a single carbon-to-carbon bonds (C-C) and commonly found in animal-based foods, whereas trans-fatty acid is the unsaturated fats being convert to a saturated fat which can be simplified as synthetic saturated fats. Unsaturated fatty acids are carbon-to carbon bonds (C=C) and it can separate into monounsaturated and polyunsaturated due to amount of double bonds in the chain.

Vegetable oils containing fats and it is widely used and produced every year to meet the consumer demand such as palm oil. Palm oil derived from the oil palm fruit trees (*Elaeis guineensis*) in Figure 1.1 is one of the plant-based oil that be made up with the same amount of saturated and unsaturated fatty acids. The rich content of Vitamin E with low amount of unsaturated fatty acids makes the palm oil a stable product compared to other oil.