

UNIVERSITI TEKNOLOGI MARA

**PALM OIL SEPARATION & RECOVERY
USING ULTRASONIC SEPARATION**

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ABSTRACT

This researched is done to make the most of new technology of ultrasonic to minimise oil losses in the extraction process of palm oil in palm oil mill. The specific objectives of the work are as follows: 1. To study the effects of ultrasonic radiation exposure types (without sonication, direct sonication and indirect sonication) towards the demulsification separation and recovery of palm oil. 2. To optimize the ultrasonic treatment condition for higher oil recovery by varying amplitude of sonication process. This research can be divided into 3 major areas of works. The first part is the preparation of the palm oil sample to form a steady emulsion of palm oil and water. The second region of work will include the investigation on impact of various ultrasonic radiation exposures on the palm oil and water emulsion test which is direct and indirect contact utilizing water shower. The propagation of ultrasonic wave from inside out is emitted in directed exposure while in indirect exposure; the propagation of wave will be from water bath outside to the palm oil sample. Last but not least, the third region of work includes the investigation on impact of various ultrasonic amplitude (1%, 4%, 7% and 10%) on the palm oil and water emulsion.

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CHAPTER ONE

INTRODUCTION

1.1 Research Background

In most palm oil mill, the usual way to obtain crude palm oil (CPO) is by mechanical screw press. However, there is still around 5-11% residual oil per dry weight retained in palm-pressed fibre (PPF) after this mechanical pressing. According to (Subramaniam,2013) in his report, he reported that the residual oil from PPF contain higher vitamin E and carotenes compare to common CPO (PPF, Vitamin E=1700-2600 ppm, carotenes=1400-1600 ppm) and (CPO, Vitamin E=600-1000 ppm, carotenes=500-700 ppm). Therefore, it is important to extract the precious substances left in residual oil from PPF. The process of recovering this oil is called demulsification.

Basic emulsions are either oil suspended in an aqueous phase (o/w), or water suspended in oil (w/o). For example, milk in which fat phase or cream form tiny droplet within skim milk which is the liquid phase (Laura Cassidy,2014). The formation of water-in-crude oil (W/O) emulsion can be occurred at many stages such as during drilling, producing, transporting and processing of crude oils. The stability of emulsion can exist in different level and it is dependent on the presence, amount, and the emulsifier's nature itself (Abdel Raouf, 2012).

Demulsification (emulsion breaking) is required in numerous reasonable applications for example, oil industry, environment technology, and waste-water treatment. Demulsification is the process of detachment of water from raw petroleum. Unrefined petroleum require to be isolated proficiently and rapidly from the water to allow further treatment such as refinery with the goal that the crude oil value can be boosted and the operating cost can be limited. (Tam Siow Fui, 2009)

Chemical, thermal and mechanical demulsification are example of demulsification method available in current market. However, in recent research (Check G. R., 2014), (Xie et