UNIVERSITI TEKNOLOGI MARA

SOLVENT EXTRACTION OF OIL FROM *Arachis hypogaea*: THE EFFECTS OF EXTRACTION TEMPERATURE AND LIQUID/SOLID RATIO

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ABSTRACT

Solvent extraction is one of techniques that can be used to extract oil. Solvent extraction is more preferable technique compared to the other techniques due to the low cost, simple and faster extraction process. It is also important to explore more sources of vegetable oil as the demand of vegetable oil is increasing rapidly due to its numerous applications. The objectives of this research are to study the effect of different extraction temperatures and the liquid/solid (L/S) ratio on the solvent extraction of *Arachis hypogaea* oil. Peanut oil was extracted using solvent extraction technique and ethyl acetate was used as solvent. The extraction temperatures were set at 35℃, 40℃, 50℃, and 60℃, 70℃, and 75℃. The samples then were prepared with L/S ratio of 3:1, 4:1, 5:1, 6:1, 7:1 and 8:1. After the solid-liquid and solvent-oil mixture were separated, the oil yield was calculated. The samples were analyzed using Gas Chromatography-Mass Spectrometry, (GC-MS) to determine the chemical constituent. The optimum condition was at the temperature of 70℃ and L/S ratio of 6:1. The oil yield obtained was 43.8%. The major fatty acid components found in the extracted peanut oil were oleic acid, linoleic acid and palmitic acid.

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CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

Vegetable oils are chemical compound that are usually obtained either from fruit or seed. They include soybean oil, olive oil, almond oil, sunflower oil, palm oil and peanut oil. According to Mughal (2011), vegetable oil contains fatty acids, di-glycerides, mono-glycerides and tri-glycerols. In most of the vegetable oils, the amount of tri-glycerols is up to 98%. He also stated that the contents of vegetable oil can be classified into saturated acid (palmitic acid, mysteric cid, stearic acid and lauric acid), mono-saturated acid (erucic acid, oleic acid and petroselinic acid) and poly-unsaturated acid (lenolenic acid, ricinoliec acid, eleostrearic acid and verolic acid).

The benefits and purposes of vegetable oil are well known in pharmaceutical, biodiesel, food and cosmetic industries. Due to the high content of triglycerides, it is suitable to be used in the formation of alkyl esters such as biodiesel and glycerol (Mughal, 2011). Zhu *et al.,* (2017) stated that edible vegetable oils are widely used for industrial and domestic purposes. Extracted oil from the seeds of cereals and legumes such as sunflower, canola, peanuts and cotton are widely used for cooking (Trindade *et al.,* 2015). Vegetable oils do not contribute to the increment of body weight due to cholesterol-lowering effect compared to animal fats (Mendil *et al.,* 2009).

Renewable sources like vegetable oil can be used in the production of biodiesel on the basis of large organic carbon content in vegetable oil. Biodiesel is one of the alternative sources of energy which is environmental friendly and can replace the diminishing fossil fuels. It contains oxygen content (10-45%) that is higher compared to fossil fuel. Apart from that, it also produces 95-98% less carbon emission which shows that biodiesel is safer to be used. Biodiesel is also easy to be transported compared to petro-diesel due to its flash point which is higher than 150℃ (Mughal, 2011).