

1 INTRODUCTION

1.1 Motivation and statement of problem

Petroleum is a liquid that is found underground. Petroleum has a lot of energy and we can turn it into different fuel such as gasoline, kerosene, and heating oil. Petroleum fuel was the main source of fuel used around the world. But as time pass by, the demand on petroleum fuel has been rising as the reliability of petro-diesel also has been increasing in most of sector in human life such as transportation, power generation, industrial processes and residential consumption. Due to high petroleum fuel consumption, the fuel source decreased as time passed and the price also risen. To cover the depletion of fuel source, renewable energy and alternative source of energy need to be explored. There are some reason for the study of alternative fuel such as technically feasible, eco-friendly, economically competitive and readily available. (Kafuku et al. 2010.). Other than the price rising, the increasing of CO₂ and greenhouse gas emission and global warming also rise the environmental concerns. From 1971 to 2001, the world energy consumption has increase two times and the world energy demand will increase 53% by the year 2030. Due to non-renewable, petroleum fuel resources will be depleted in the future. (Maceiras et al, 2011). There are some report claimed that if the pace of consumption remain constant, the oil and gas reserves may depleted another 41 to 63 years from now. (Reports and Publications. Statistical review of world energy; June 2007.). In order to cover the depletion of petroleum fuel. Many research has been done to find another type of alternative fuel and energy such as nuclear, wind, solar, biofuel, hydro, and biodiesel but all this is still in research and development stage.

Biodiesel is technically competitive to conventional fossil diesel but relatively cheap fossil diesel prices have made the technology economically unfeasible for almost a century. However, recent high and rising world crude oil prices and claims that the world oil reserves are diminishing and environmental and political pressure have caused an urge in the development of the technology of biodiesel production. In view of the rising crude oil prices, forecasted shortages of fossil fuels, climate change, and the need for new income and employment opportunities in rural areas, biofuels have taken centre stage in policy debates in Malaysia. The technical feasibility of biodiesel production has proven

to be viable as biodiesel markets are currently growing exponentially in a number of countries. However, the question remains whether commercial biodiesel production will be economically feasible in Malaysia?

Recently, coupled of research has been done by the researcher to find another alternative fuel from vegetables oil and one of the potential plant is *Moringa oleifera*. According to Umer et al. (2008) *Moringa oleifera* can be used as the source of biodiesel fuel. This plant contain 72.2 % of oleic acid, 7.1 % of behenic acid and low amount (1.0 or less) of polyunsaturated fatty acid methyl ester.

1.2 Objectives

The following are the objectives of this research:

To investigate the feasibility of producing biodiesel from *Moringa oleifera* seeds oil.

1.3 Scope of this research

The following are the scope of this research:

- i) Oil extraction from *Moringa Oleifera* seeds using soxhlet extractor.
- ii) Transesterification process under different temperature, reaction time and weight of oil to methanol ratio.
- iii) Cost of production for 1L compared to current diesel prices.

1.4 Main contribution of this work

The following are the contributions of this work is new alternative fuel to replace diesel in supply power will be produce. This biodiesel product is more environment friendly compared to diesel which can emit a large amount of greenhouse gas during the combustion process. The second contribution is a fuel which is renewable can replace the diesel fuel that is non-renewable. A renewable fuel is unlimited feedstock that can be using without any worries on shortage of feedstock.

1.5 Organisation of this thesis

The structure of the reminder of the thesis is outlined as follow:

Chapter 2 provides a description on the general information of biodiesel. Next application and general description of *Moringa oleifera* and the third is transesterification process for biodiesel production.

Chapter 3 show a review of the extraction of oil from *Moringa oleifera* seeds by using soxhlet extractor. The oil will undergo transesterification process under the maximum parameter such as methanol to oil weight ratio, the reaction time and reaction temperature to get the highest yield of percentages of methyl ester production. The production cost of biodiesel calculate and compare to the other biodiesel fuel.

Chapter 4 gives a prediction result of the experiment. The feasibility of the yield calculation will be used the maximum parameter to get the highest yield and for financial feasibility part will be based on an optimum size biodiesel production plant in Malaysia.

Chapter 6 draws together a summary of the thesis and outlines the future work which might be derived from the data provided in this work.