

CHAPTER I

INTRODUCTION

1.1 Introduction

Besides hydroelectricity and nuclear energy, the major of energy consumed worldwide comes from petroleum (fossil oil), charcoal and natural gas. Diesel fuel obtained from distillate fraction of crude oil is one of the favor consumed non-renewable energy. The demand of diesel fuel in Thailand was consumed about 17,000 million liters per year, which was 45.7% of total consumption of the petroleum products. The consumption of diesel fuel in Thailand is being rather continuously increased as shown in Figure 1.1 [1]. Nowadays the prices of petroleum and natural gas dramatically increase and vacillate regarding the resource reduction [2]. Thus, the alternative sources of energy are vital importance.

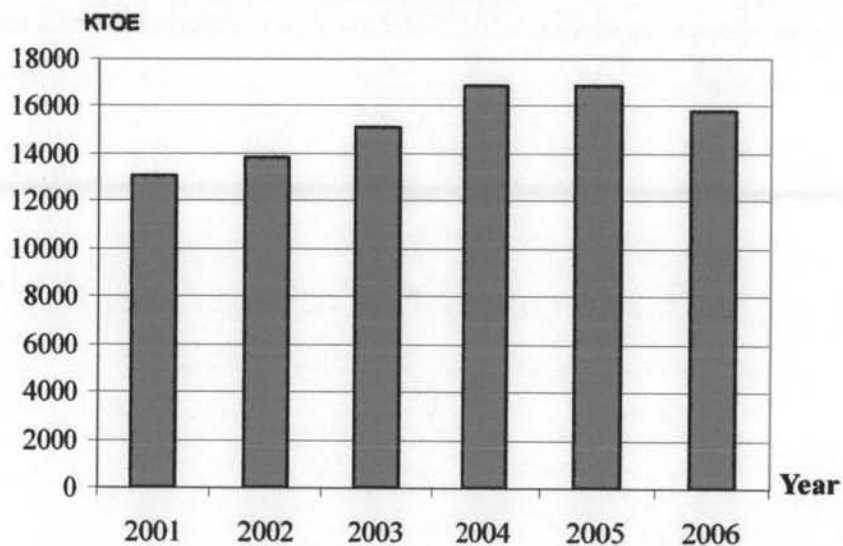


Figure 1.1 Diesel fuel consumption of Thailand in 2001-2006

Biodiesel or alkyl ester is an alternative diesel fuel, which made from renewable biological sources such as vegetable oils and animal fats. One hundred and seven years ago, Rudolf Diesel had tested peanut oil as fuel for his engine. He expected that his new machine would run on fuels derived from plants, but cheap

petroleum proved more popular. In the 1970s, the oil rekindled interest in the use of renewable fuels because of the prices of petroleum products and global warming concern. These focusing have been paid on vegetable oils and animal fats to make biodiesel fuels. Biodiesel is an environmental acceptable, it does not contribute to global warming because of biodiesel fuel has the potential to reduce the level of pollutants. For example, the sulphur content of vegetable oils is close to zero, the environmental damage caused by sulphuric acid is reduced.

Among the major oil crop species in the world, palm oil has one of the highest oil yields. In Thailand, oil palm is well suited to this environmental climate and grows well. Oil palm is also among the top major oil crops in the country and its average growth of harvested areas increased due to the Thai government had a policy in a large scale production of biodiesel growing oil palm. Biodiesel is produced through a process known as "transesterification". Transesterification is a general term used to indicate the direct conversion of triglycerols lipids by alcohols to alkyl esters without first isolating the free fatty acids (FFAs). Especially in alcoholysis, the triglyceride from a fat or oil is reacted with excess alcohol in the presence of a catalyst [3]. It improves the quality of the environment with a pleasant fruity odour and with less (and fat less pernicious) soot generated in the exhaust of vehicles using it [4]. The main advantages of using biodiesel are its renewability, better-quality exhaust gas emissions, it given that all the organic carbon present is photosynthetic in origin, it does not contribute to a rise in the level of carbon dioxide (CO₂) in the atmosphere and consequently to the greenhouse effect [5].

Although biodiesel has several advantages but it has gone defects when is used in long-term. The fatty acids in the oil would start to congeal and harden (coke up) on the inside of engine as well as in fuel injectors, eventually leading to big, expensive engine problems [6]. These problems led to the study of adsorbent which adsorb FFAs in biodiesel. Especially, the adsorbent is interesting because it has low cost and high efficiency to give high biodiesel's quality and low capital production.

1.2 Objective

This study is to reduce the FFAs content of biodiesel synthesized from crude palm oil via base-catalyzed process.

1.3 Scope of the study

The scopes of the study are the preparation of biodiesel from sodium hydroxide catalyzed transesterification of crude palm oil and methanol and reduction of the FFAs of the biodiesel with adsorbents.