CHAPTER I
INTRODUCTION

The use of vegetable oils in diesel engines is nearly as old as the diesel engine itself. The inventor of the diesel engine, Rudolf Diesel, reportedly used groundnut (peanut) oil as a fuel for demonstration purposes in 1900. The fuel and energy crisis of the late 1970's and early 1980's as well as accompanying concerns about the environment and depletion of the non-renewable resources provided the incentives to seek alternatives to conventional, petroleum-based fuels. Now, vegetable oils were remembered and occupy a prominent position in the development of alternative fuels (Knothe, 1997).

Biodiesel has an ambiguous definition. It stands for neat vegetable oils as well as neat alkyl esters prepared from vegetable oils and blends of conventional diesel fuel with vegetable oils or alkyl esters. But due to the main features of fatty acid methyl esters such as lower viscosity as compared to the vegetable oil, better quality exhaust gas emissions and efficient performance without modifying the diesel engines, the term "biodiesel" increasingly refers to alkyl esters of vegetable oils and not the vegetable oil itself.

Biodiesel can be prepared by transesterification of vegetable oil. In this process, the vegetable oil that consists mainly of triglycerides reacts with alcohol to form mixtures of alkyl esters and glycerol.

Different vegetable oils have been tested as a material for producing biodiesel. Often vegetable oils investigated for their suitability as biodiesel are those which occur abundantly in the country of testing. For example, soybean oil in the United States, rapeseed and sunflower oils in Europe and palm oil in Malaysia are being considered (Srivastava, 2000). In Thailand wherein coconut oil and palm kernel oil are produced abundantly, these would be a potential raw material for making biodiesel.

Numerous studies on the transesterification of refined vegetable oil have shown that the use of homogeneous catalysts results into high methyl esters yield (Fangrui, 1999). Industries are now using basic catalysts like sodium hydroxide, potassium hydroxide and sodium methoxide. However, the cost of biodiesel is the

main hurdle to commercialize the product. So the use of crude vegetable oils as raw material is one of the primary options to be considered.

It is also a great challenge to explore on the use of heterogeneous catalysts for the transesterification of vegetable oil. It is believed that the heterogeneous catalysts will replace the homogeneous catalysts in the near future because of environmental constraints and simplicity of the process as compared to the existing one.

This research was focused on the production of biodiesel from crude coconut oil and palm kernel oil. The effect of using homogeneous catalyst in the transesterification was considered. Preliminary catalyst screening was also done to identify potential heterogeneous catalysts.