

CHAPTER I

INTRODUCTION

Each year, Thailand consumes approximately 8,000 million liters of gasoline and 20,000 million liters of diesel fuel. Although Thailand imports crude oil of around 300,000-600,000 million barrels per year to produce fuels for automobiles, gasoline and diesel fuel are also imported to meet the increasing domestic demand (Polabut, 2002). On the other hand, more stringent regulations on the sulfur content in diesel fuel are being implemented down to 0.05 % and a tendency to even lower values in future (The Ministry of Commerce of Thailand, 1998).

Fuels derived from vegetable oils or animal fats have been considered as an alternative to diesel fuel because of their advantages, including lower sulfur, hydrocarbon and particulate emission, good lubrication properties, renewability and availability. To use such the fuels, vegetable oils can be used directly as neat vegetable oils or through transesterification to fatty acid methyl ester (FAME) or biodiesel. Neat vegetable oils are economical for use but have a high viscosity, which affects the atomization in diesel engines, whereas FAME can be used without the high viscosity problem but its main problems are high production cost and corrosion (Polabut, 2002).

Palm oil is one of the interesting vegetable oils to be used as alternative diesel because it can give a large amount of oil (Polabut, 2002). There are two types of palm oil classified by parts from which the oils are taken. Palm oil is oil from palm fruits and palm kernel oil is oil from its kernel (www.cpi-th.com, 2002). Because of their high viscosity, palm oils are refined to remove some impurities and blended with diesel to decrease their viscosity (PTT Public Co., Ltd., 2002).

Despite the importance of the atomization, which is the initial stage of combustion, a few studies have investigated effects of adding vegetable oils to diesel fuel on the atomization characteristics of the blends. In this work, the effects were investigated using refined palm oil and refined palm kernel oil. The results were also correlated using simple mathematical equations. In addition, effects of temperature on the characteristics were also studied.