CHAPTER I INTRODUCTION

Diesel engines are a major and widely used for its excellent drivability and thermal efficiency. At the same time, diesel engines are major contributors of various types of air pollutant emissions such as Carbon monoxide (CO), Oxides of Nitrogen (NOx), Particulate matter (PM), and other harmful compounds. It has been demonstrated that the formation of these air pollutants can be significantly reduced by incorporating or blending oxygenates into the fossil fuels.

On the other hand, since the global energy crisis in the 1970s, researchers have sought for ways to alternative, renewable fuels (Fernando, 2004). Recently, the interest has turn to using oxygenate diesel or ethanol—diesel blends in diesel engine. Ethanol is a renewable energy, it can be made from all kinds of raw materials such as sugar cane, molasses, cassava, sorghum, corn, and waste biomass materials etc. In addition, ethanol known as a diesel oxygenate, while compatible, does not blend effectively with diesel and require an emulsifier or additive to produce a stable fuel (Ahmed, 2001).

After evaluating some potential oxygenating agents for their physical properties, chemical characteristics, stability, availability, reliability, toxicity, cost and possibility of air-pollution improvement, ethyl acetate, is considered a hopeful agent. Its molecular formula is CH₃COOC₂H₅, or C₄H₈O₂ and molecular weight is 88.10. Its boiling point, flash point, and density are 77.2°C, -5°C, and 0.902g/cm³ at 20°C, respectively. The absolute viscosity of ethyl acetate at 25 °C is 0.426 centipoise (cP). This chemical agent typically produce by the esterification of acetic acid with ethanol. Rather, this would be an alternative process that uses low purity feed (e.g. ethanol), being most viable where cheap ethanol was readily available and acetic acid was not (e.g. Brazil, South Africa, Thailand). This could be even more important in the future, when pressure to use more renewables could see ethyl acetate being manufactured from bio-derived ethanol, e.g. corn steep liquor (www.chemsoc.org). The addition of ethyl acetate into a fuel oil may enhance the fuel oxidation reaction

that might result in a significant reduction in particulate matter, toxic gas and black smoke emissions, since ethyl acetate contains 36.36 wt% oxygen compound. Consequently, It is, therefore, of great interest to investigate the effects of using ethyl acetate as an oxygenating additive for diesel fuel on the fuel property and emission characteristics under given condition.