CHAPTER I

INTRODUCTION

Exhaust emission of diesel engines always crates the air pollution because it generate toxic substances, for examples, polycyclic aromatic hydrocarbons(PAHs), carbon monoxide(CO), sulfur dioxide(SO_2), oxide of nitrogen(NO_x). Especially, Polycyclic aromatic hydrocarbons may reasonably be anticipated to be carcinogens. Studies in animals have also shown that PAHs can cause harmful effects on skin, body fluids, and the body's system for disease, react through formation of covalent bonds with reactive centers in DNA, RNA, or protein of target cells[1], after both short- and long-term exposure. These effects have not been report in humans.[2]

Scientists have been trying to reduce the quantity of PAHs for a long time, for example, i) modifing the engine and improving fuel by using alcohol, ether, aldehyde, ketone as oxygenated compounds, ii) eliminate PAHs that have already occurred by using bio-surfactants which be produced from microorganisms however removal of PAHs has been incomplete, particularly for the high molecular weight compounds.[3]

The use of oxygenates to produce cleaner burning diesel fuel was initially considered over fifty years ago. Oxygenated compounds increase oxygen content to the fuel which consequently leads to complete combustion in the engine. Generally, the addition of an oxygenate to the fuel reduces carbon monoxide and hydrocarbon emissions. The particulate reduction is accompanied by small increases in NO_x emission. Non-regulated aldehyde and ketone emissions are also reduced by the addition of an oxygenate.[4,5,6]

Oxygenated compounds were blended with fuel to reduce toxic substances in exhaust emission. Blend fuel consists of alcohol and diesel fuel are not as easy to produce as on gasoline alcohol blends, since alcohols are more polar and refuse to blend into diesel fuels. Therefore, a solubilizer has to

be used to ensure a stable mixture, for example a solution or a micro-emulsion. Thus in this study, Fusel oil is selected as the oxygenated compound and blended into base diesel oil. Blended fuel is tested the effect of fusel oil on the amount of PAHs with diesel engine.

Theoretically, the fusel oil which consisted of alcohol compounds is mainly reduced the amount of PAHs because the combustion of the blended fuel is more completed than base diesel oil.