

CHAPTER I



INTRODUCTION

During the past decade, air pollution has been one of the major problems in Thailand, as a result of the rapid growth of the economy of Thailand . Thus, fuel consumption keeps increasing due to the expansion of transportation and industry, especially in large cities such as Bangkok, Chiangmai and Songkhla, as well as in dense industrial areas. The number of vehicles is increasing rapidly.

Pollution makes the air quality in Bangkok and big cities getting worse. This affects not only the environment, but also human health. One way to alleviate this pollution is to develop fuels that contain lesser amounts of toxic substances and enhance the efficiency of combustion.

The combustion of fuel in the engine emits many toxic substances such as hydrocarbons (HC), carbon monoxide (CO), oxides of nitrogen (NO_x), aldehydes and particulate matter.

Diesel particulates are considered a potential health hazard, mainly because of the polycyclic aromatic hydrocarbons (PAHs) present in the solvent organic fraction (SOF) of the particulate. Some of these PAHs are known to be carcinogenic. Polycyclic aromatic hydrocarbons and their derivatives are a group of toxic compounds generally formed as a result of incomplete combustion and pyrolysis of fossil fuel and other organic materials. They are widespread in the environment. One of the major sources of PAHs is diesel engines. The mutagenic activity of PAHs on tissue has been well documented[1].

The use of oxygenates to produce cleaner burning diesel fuel was initially considered over fifty years ago. Oxygenated compounds increase oxygen available to the fuel which consequently leads to complete combustion in the engine. In general, 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[2].

In many studies, oxygenated compounds were blended with fuel to reduce toxic substances in exhaust emission. Fuel blend consisting 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 well with diesel fuels. This being so, a solubilizer has to be used to ensure a stable mixture, i.e. a solution or a micro-emulsion. Thus in this study, consideration is given to the additive solubility and cost of oxygenated compound.

Objective and Scope of the Research

The objective of this research was to study the effect of fuel blend consisting of alcohol on PAHs in exhaust emission of diesel engine.

The scope of this research is to study the effect of diesel fuel blends consisting of isoamyl alcohol on PAHs in diesel exhaust, to study the effect of engine speed on the amount of PAHs in diesel exhaust, and to compare the diesel fuel blend with base diesel fuel.