CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The emulsification stability and fuel properties of diesohol emulsion were investigated in order to evaluate the potential of using biodiesel as an effective emulsifier for diesohol and making the use of diesohol as an alternative fuel for diesel engine. The results of this study could be concluded as follow:

1. Palm oil derived biodiesel could be used as an effective additive for diesohol emulsions;
2. For diesohol production, anhydrous ethanol should be used;
3. Intersolubility of the components of diesel-biodiesel-ethanol system decreased with decreasing temperature. However, at the temperature above 20°C there was not any problem about phase separation;
4. Density and pour point of all the blends were under the standard limit for diesel fuel;
5. The high cetane value of biodiesel could compensate for the cetane decreased caused by the presence of ethanol in diesel fuel;
6. Heat of combustion of all the blends were found to be lower than that of diesel fuel alone. However, heating value of the blends containing ethanol lower than 10% were not much different from that of conventional diesel;
7. All of the blends containing ethanol were highly flammable with flash point temperature that was below the ambient temperature;
8. In general, the diesohol blends containing 5% ethanol had very close fuel properties compared to diesel fuel. In this study, the blend of 90%diesel, 5%biodiesel and 5%ethanol had the heating value very close to that of diesel fuel. And the blend of 80%diesel, 15%biodiesel and 5%ethanol had the highest cetane index;
9. As for the emissions of the blends, it was found that CO and HC reduced significantly at high engine load whereas NO_X increase when compared

to that of diesel. Fuel consumption rate of the blends was very different from that of diesel depending on the load condition;

10. Taking these facts into account, the blend of 80% diesel, 15% biodiesel and 5% ethanol was the most suitable ratio for diesohol production because of the acceptable fuel properties and reduction of emissions.

5.2 Recommendations

The addition of ethanol to diesel fuel lowers its flash point. Diesohol blends are flammable liquids and should be handled like gasoline. There is the potential for an ignitable fuel vapor/air mixture to exist above diesohol. This should always be kept in mind when handling diesohol fuels. Consequently, personnel who work with diesohol blends, including fueling personnel and service/maintenance personnel, should be thoroughly trained to understand that diesohol blends carry a greater flammability risk than standard diesel fuels.

For biodiesel, the Thai government has approved a budget of 1.3 billion Bath (or about 32.5 million US$) for biodiesel development during 8 years' period, from 2005 to 2012. A target is set to produce 8.5 million liters of biodiesel by 2012. That amount of biodiesel will be used to produced B10 (the mixture of 90% diesel and 10% ethanol) as included in the national strategic plans and policies for energy. Therefore, in order to encourage diesohol production which has biodiesel as much as 15% with 5% ethanol and 80% diesel as showed the best performance in this study, it is strongly needed support from the government and private sectors. However, before going to that point, the further studies on molecular level and interaction between the three components should be done in order to make more understanding about the unique characteristic of this fuel blend. Engine performance and long-term effect must be carried out to ensure that this fuel blend really has a promising future. In addition, finding the optimum percentage of ethanol in the fuel blend that causes no problem to the engine (like 10% ethanol in gasohol that has been already proved) is a good point for the next study.