

CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusion

Cycloalkyl nitrate compounds and tetrahydrofurfuryl nitrate could be prepared by nitration of cycloalkyl alcohols such as cyclohexylmethanol, 2-cyclohexylethanol, 1,4-cyclohexanedimethanol and tetrahydrofurfuryl alcohol with concentrated nitric acid and concentrated sulfuric acid, while maintaining the temperature of the reaction at $0 \pm 2^\circ\text{C}$, but only the reaction temperature of tetrahydrofurfuryl nitrate should be below -20°C in the presence of dichloromethane. These synthesized nitrate compounds were cyclohexylmethyl nitrate, 2-cyclohexylethyl nitrate, 1,4-cyclohexanedimethyl nitrate and tetrahydrofurfuryl nitrate.

In this study, all of products were obtained in high yield. Moreover, the products were substantially pure which was the benefit of this process. These synthesized nitrate were easily soluble in base diesel fuel which did not change their physical properties within the specification of diesel fuel at the concentration of 0.05%, 0.10%, 0.20%, 0.30%, 0.40% and 0.50% by weight. The calculated cetane index of the blended base diesel fuel was increased approximately for 3.96 and 6.39 units at concentrations of 0.05% and 0.10% by weight, respectively. In case of the cetane number, cetane improvement values from the nomograph of Octel Company, were increased approximately for 2.98 and 4.99 units at concentrations of 0.05% and 0.10% by weight, respectively, as compared with base diesel fuel. The blending of synthesized nitrate compounds gave higher cetane numbers as comparing with

2-ethylhexyl nitrate, the commercial available cetane improver. Especially tetrahydrofurfuryl nitrate, the cetane number of this compound was increased more than the others. Then these synthesized nitrate compounds had potential to be used for improving cetane number in base diesel fuel.

5.2 Suggestions for future work

Cetane improvers generally contain nitrogen and some concern about the formation of addition NO_x has been raised, therefore, future studies, focus on low-nitrogen cetane improvers and nitrogen free cetane improvers.

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