CHAPTER V
CONCLUSION AND RECOMMENDATION

V.1. Conclusion

Based on the experimental results of the biodiesel production from used cooking oil, which contain high free fatty acid using subcritical methanol, it can be concluded that:

1. Pressure and temperature influence FAME yield of product, and UCO to methanol ratio gave effect towards esterification and transesterification between UCO and methanol to form FAME or biodiesel. The yield of FAME can reach up to 88.43%.
2. FAMEs content in the maximum yield are Undecanoic Acid Methyl Ester (C11:0), Myristoleic Acid Methyl Ester (C14:1), cis-10-Pentadecenoic Acid Methyl Ester (C15:1), Stearic Acid Methyl Ester (C18:0), Oleic Acid Methyl Ester (C18:1n9c), Elaidic Acid Methyl Ester (C18:1n9t), cis-8,11,14-Eicosatrienoic Acid Methyl Ester (C20:3n6), Heneicosanoic Acid Methyl Ester (C21:0), Arachidonic Acid Methyl Ester (C20:4n6), cis-5,8,11,14,17-Eicosapentaenoic Acid Methyl Ester (C20:5n3), Erucic Acid Methyl Ester (C22:1n9) cis-13,16-Docosadienoic Acid Methyl Ester (C22:2) and Tricosanoic Acid Methyl Ester (C23:0). The FAME purity of maximum yield is 97.68%.
3. Based on the response surface methodology, the optimum condition for biodiesel production from used cooking oil using subcritical methanol are: pressure of 45 bar, temperature of 174.7°C and UCO to methanol ratio

is 3.263:10. The maximum theoretical yield of biodiesel is 88.8115%.

V.2. Recommendation

In subcritical condition, temperature and pressure are very influential toward the yield of FAME. At high temperature, methanol easily turns into gas phase, so to keep methanol in liquid phase, the vapor pressure of methanol must be calculated and the pressure of subcritical reactor should be higher than vapor pressure of methanol at certain temperature. The reaction between methanol and UCO in liquid phase is more intensively and easier.

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