

# CHAPTER V

## CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

The following conclusions are drawn from the study:

- 5.1.1 Unreacted methanol dissolves in crude glycerol phase more than in crude biodiesel phase.
- 5.1.2 Residue catalysts and soaps dissolve in crude glycerol phase more than in crude biodiesel phase.
- 5.1.3 Amounts of waste components and washing water increases with an increase in amount of catalysts.
- 5.1.4 The scale of biodiesel production process does not have any effect in the distribution of waste in each phase of reaction products.

### 5.2 Recommendations

Recommendations for future studies and research are as follows:

- 5.2.1 Free fatty acids are one of the most important parameter. They have effect in basic catalyzed transesterification process. The further study should be study technique for reduced amount of free fatty acids as convert them to product of methyl esters by acid catalyzed pre-treatment process.
- 5.2.2 The purification step affected with the waste from process. The further study should be study other techniques to purification products as the distillation or modified the washing techniques from spray washing to bubble washing or neutralize products before washing.