

## Chapter VI

### Conclusion and Recommendation

#### 6.1 Conclusion

From the experiments, it can be concluded that the parameter effecting mixing system for the preparation of heavy duty liquid detergent built formula are as follows.

1. Sequence of mixing type 3 was the most suitable sequence for the preparation of liquid detergent built formula.
2. Turbine and paddle impellers in the standard tank configuration, set at a height equal of  $1/5$  of the tank diameter from the bottom of the tank could be used to prepare liquid sample in the case when the mixture had low viscosity .
3. Liquid composition after addition of LAS and AES in the last step had high viscosity and was a non-homogeneous liquid. Two 6-blade disc turbine should be used to promote homogeneous mixing .
4. Ingredients, introduced and mixed in each step of the mixing sequence effect the viscosity of the mixture . After addition and mixing of LAS and AES into the composition in the final step the product obtained had high viscosity.
5. Viscosity of the mixture consisting of sodium carbonate, CMC, STPP and LAS decreased when temperature of system increased .
6. T.K.AGI HOMO MIXER was found to be a suitable mixing system for the preparation of homogeneous liquid detergent built formula.
7. Color and odor stability of liquid detergent product were stable after 2 months under ambient temperature and more severe condition.

8. Viscosity of liquid detergent product were stable under ambient temperature after 2 months but in severe conditions slight separation of liquid composition occurred and the viscosity of the liquid decreased slightly.
9. The composition, which were stored in transparent plastic bottle under ambient temperature showed no separation of the phases. Only under severe conditions, exposed in sunlight and in an oven at 45 °C , a slight separation occurred.
10. When liquid samples were subjected to a freeze-thaw stability test, the composition remained stable .
11. Comparision of properties of liquid detergent built formula in this experiment with available liquid detergent present in the market showed that the liquid detergent of this experiment has similar properties.

## 6.2 Recommendation

To complete the study in the preparation of heavy duty liquid detergent built formula, further studies should be carried out as follows :

1. Different formulation of heavy duty liquid detergent built formula should be studies in order to modify new special formula.
2. Decreasing viscosity materials, hydrotrope such as sodium toluene sulfonate, sodium xylene sulfonate, should be studied to improve viscosity problem in mixing sequence.
3. Studies should be done on a larger scale because many factors which affect small systems do not affect large systems such as vortex formation, dead region ,micro and macro mixing effects.
4. Power consumption in each mixing condition should be investigated more thoroughly .