CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

A methodology for measuring required mixing time by measurement of Ca-content in agitated batch mixer using Inductive Coupled Plasma Optical Emission Spectroscopy (ICP-OES) gave the result that could be concluded about the mixing system as follow:

1. The required mixing time was found to be inversely proportional to the rotational speed of impeller.

2. The required mixing time depends on the flow pattern and properties of lubricating oils. At high rotational, turbulent diffusion will have increasing influence on further movement of lubricating oils.

3. Two dimensionless numbers; mixing time, τ, as defined Nt_m, and Reynolds number, Re as defined $\rho D_i^2 N/\mu$, which correlate mixing time and other variables of the process, including vessel geometry relative to impeller diameter and physical properties of lubricating oils, have a linear corelation which can be expressed as

$$\tau = 0.367\ R_e + 2582.420$$

5.2 Recommendations

In the present experiments, the limitation of performance equation (5.12) as follows:

1. It was only applied in lubricating oils as additive element is Ca-compound but for further metal compounds in additive elements; such as: Zn, Mn, S, P, will adjust in a similar manner from this study.

2. It can be applied in large-scale equipment no greater than 10,000 lts. Because large-diameter impeller would be inconvenient and the propeller is placed on a shaft entering through the side of the large-scale tank.

3. It can be applied in the range of viscosities @ 100 ^{o}C: 12, 14 and 19 cSt. (approximately)

Another interesting study are the investigation of heat and the differences in viscosities of the components and the final product viscosities.