CHAPTER V

CONCLUSIONS AND SUGGESTIONS

5.1 Conclusions

5.1.1 Characterization

1. The density of synthetic fly ash Class F was higher than that of Class C and it decreases as the alkali content increases for both Class F and Class C.
2. The refractive index value tends to increase as the alkali ions increase for both Class F and Class C fly ash.

5.1.2 Observation of Leaching Mechanism

1. The leaching rate was used as a measure of reactivity since it is the real amount of silica dissolved to the solution at that pH
2. The Mineql+ results shows that the overall reaction in leaching test was undersaturated condition but there were some formation of Hermatite and Chrysotil, which are insoluble compounds of Fe and Mg.
3. Order of the leaching rate of element follows solubility at each pH; K> Na >Al>Si>Ca>Mg>Fe.
4. Leaching rate was found to be a combination of diffusion and dissolution rate. They proceed simultaneously but with different rate depending on the glass structure
5. Precipitate of Ca and Mg phases can obstruct the leaching rate as shown by the reduction of leaching rate at later age
6. The major leaching mechanisms of the overall samples at pH 11.5 and 12 were both the diffusion and dissolution reactions, with the exception of C4 for which the significant mechanism was the diffusion reaction. However at pH 12.5, most samples under went a diffusion as a dominant mechanism, except for F3, which underwent diffusion and dissolution as main reactions.
8. From a comparison within the Class C series, it was found that the order of leaching rate was C4<C3<C2<C1<C5. For the Class F series, the order of the

leaching rate was F3<F2<F1. Both were in the same order as their alkalis content suggesting the leaching rate was depended on the alkalis content.

9. The leaching rate of Class C increased with pH whereas the dissolution rate of Class F did not vary much with the pH.

5.1.3 Possible Parameters Controlling Leachability of Synthetic Fly Ash

1. The density value can be used to estimate the leaching rate of synthetic fly ash Class F. When the density was increases, the leaching rate reduced.
2. The leaching rate of silicate glass increased dramatically with the increasing of the alkalis content.
3. The present of alkaline earth, Ca and Mg, inhibits the leaching rate of synthetic fly ash.
4. The CaO/Na_2O+K_2O ratio can be used to estimate the leachability of fly ash. Fly ash with a lower CaO/Na_2O+K_2O ratio and in peralkaline composition tends to have a higher leaching rate and serves as a good pozzolan.
5. The NBO/T value can be used to predict the leaching rate for Class F. It shows that glass with a high NBO/T ratio inclines to have low dissolution rate.
6. The ternary diagram can be used to compare among four glass parameters; network former, network modifier, intermediate, and leaching rate. Thus, it might be used to determine the leaching rate of glassy phase in fly ash at the same leaching condition.

5.2 Suggestion for future work

More mixture composition should be prepared to determine the correlation between pozzolanic reactivity and glass composition. Moreover, leaching test on real fly ash should be done to confirm that the ternary diagram would work in an actual case.