

CHAPTER 8

SUMMARY AND CONCLUSIONS

The main purpose of this research was the comparative determination of organic matter and soluble salts of ball clays in Thai sanitaryware industry. For the information of this discovery and the future benefit, we should set up the desired ideal ball clays which has benefits to Thai sanitaryware industry. The major conclusions of this work are:

1. NMR spectroscopy is suitable way to identify the humic acid structure. Further work need to be conducted in form of quantitative analysis of humic structure.
2. We can improve rheological and casting properties by added selected humic acid to the ball clays.
3. There are many sources of humic acids can be used to improve ball clays. These are include commercial humic acid and the extractable from other humic sources, for example from shale or clay lignite.
4. The effect of humic acid on ball clay depend on its structure so they have not show the same effect from different humic acid type on both rheological and casting properties.
5. MS is the most appropriate local ball clay for sanitaryware industry, in term of general characterization, organic matter, soluble salts, rheological and casting properties.
6. There are absolutely differences of mineralogy and microstructures between imported and local ball clays.
7. The effective organic matter in ball clay is the humic acid not non-humic substance. So we should not consider only organic carbon to forecast the rheology and casting behaviors.
8. REX is the clay that has low organic matter but show different portion of humic substance from the others. It has very high β -humus; however it has shown the suspicious results of good rheological and

casting properties. Because this clay is not foremost in Thailand so it is difficult to get more sample to extract humic substance and identify it.

9. The interested humic substance is HVC humic acid that has lower viscosity but gives higher gelation and casting rate.
10. The dominant of SB-75 is high Na (can cause from sodium silicate in noodle shape preparing process) that causes large double layer so it has high stability of viscosity, very low gelation thus the lowest casting rate.
11. We can not improve the general characteristic of ball clay but we can improve ball clays by adjust humic acid and soluble salts (in case of SB-75). Beside, we should compromise the rheological and casting properties carefully due to some humic acids
12. Microstructure of ball clay by TEM can be explained by mineralogy of ball clay as higher order kaolinite, which show pseudo-hexagonal shape in the case of BB. The microstructure of clays can be used to explain some of their characteristics for example JK was reported to have slippery property when having water retention, which results from SEM technique show very thin plate of particles.
13. This research has proof the effect of humic acid on ball clay (using MT) that humic acid gave contrasting results on rheological and casting properties depending on the type of humic acid.