

CHAPTER 6 CONCLUSIONS

6.1 Conclusion

To increase the competitiveness of tableware ceramics for Thai SMEs, differentiation could be done through innovation and relevant knowhow under the constraint of the existing technology. This research focused on the research and development of ovenware clay body for tableware ceramics which was concluded as follow:

For commercial grade raw materials; to achieve the cordierite composition of 52 wt% SiO₂, 38 wt% Al₂O₃, 10 wt% MgO according to phase diagram; 28.41 wt% talc, 30.94 wt% kaolin, 30.94 wt% ball clay, and 9.71 wt% alumina were used. The composition with 10-15 wt% spodumene added was fired at the heating rate of 80°C/hr to 1250°C and soaked at the temperature for 1 hour. The optimum conditions gave the largest amount of cordierite with low COE ($3.52 \times 10^{-6} \text{C}^{-1}$), low water absorption (0.05%), firing shrinkage (13.42%) thermal shock resistance at 290°C.

Rice husk ash was used to replace silica in cordierite synthesis body applying the formulation in the proximity of the cordierite composition according to the MgO-2Al₂O₃-SiO₂ phase diagram. Cordierite was observed only at the firing temperature as high as 1300°C and not the lower. The material was thus considered not be promising for further study.

Sludge cake from aluminum scrap and dross recycling industry (Aw) was used as the main source of alumina in comparison with clay bodies using commercial grade one (C). Like the C clay body, cordierite phase was observed for the Aw clay body fired at 1250 to 1325°C. Properties of samples Aw were greater than samples C at all firing temperatures. The optimum conditions were obtained from 21.31 wt% sludge cake, 20.74 wt% kaolin, 20.74 wt% ball clay, 37.22 wt% talcum. Firing clay body of the conditions gave large amount of cordierite with low COE ($3.95 \times 10^{-6} \text{C}^{-1}$), low water absorption (8.67%), firing shrinkage (14.52%), and thermal shock resistance at 290°C.

Even though this research aimed at the development of ovenware ceramics, however, the properties of some firing clay bodies are beyond expected which were as high as those of flameware ceramics. The studies manifested that sludge cake from aluminum scrap and dross recycling industry are promising as a source of alumina for flameware ceramics. As a result it is beneficial for Thai ceramics industry competitiveness in terms of alumina import substitution or self-sufficiency, cost saving, and environment-friendly product.