CHAPTER 6

CONCLUSIONS AND FUTURE SUGGESTIONS

The experimental work in this thesis deals with several factors concerning the refining of local ball clay by spray drying, starting from raw materials selection, preparation process, slip control and properties of clay granules that should be suitable for application therefore the conclusion has to be made accordingly as the followings :

1. Raw materials ; BCW and Ranong kaolins (B85 and K325) each has the characteristic of its own that can not be used as single resource for this purpose. BCW has high Fe_2O_3 and organic matter content whereas kaolin clay has high Al_2O_3 resulting in a long firing range and refractoriness. Therefore, to produce a refined clay from local raw materials, the required composition is achieved by blending.

2. Rheology of slip depends on raw materials and additives. By means of spray drying condition, slip properties should be shear thinning and be close to pseudoplastic type that the flow of slip will be consistent and workable. In reality, the flow type of clay slips has not been identified exactly because most of clay slips normally display combined thixotropic and rheopectic type of flow.

3. Binder is not necessary for the spray drying of ball clay because, by nature, the clay has colloidal particles that present the function of binder itself but the binder is needed in controlling the flow of slip. The viscosity of slip should not be too high or too low. The

range of working viscosity is 70-200 centipoises, in the case of the Spray Dryer L-8.

4. Only the slip control cannot increase the granule size. The main factors are feed rate and speed of the atomizer that can effectively increase the size of granule so the optimal condition of the dryer has to be worked out. Besides, the type of atomization is another factor that limits the granule size. Normally nozzle atomization is used to produce bigger sizes.

5. Local spray dried granules, RC9 and RC11, have the positive Properties, i.e. high plasticity, fired color and firing range which are suitable for a wide range of application. The average size of granule is smaller than Hypure Vector® so it can be easily dispersed but its smaller size causes high loss in packaging and recovery process of production.

The results obtained in this experiment are based on spray drying by centrifugal atomization with co-current flow in a laboratory scale that may have different conditions compared with the production scale which may cause the different result in granule properties. However the practical way to find out the solution is commonly done by controlling the slip properties to be suitable for each spray drying system or design.

Further suggestion :

- To find another dispersant that improves the stability and solid content of the slip better than Na_2SiO_3, such as STPP (Sodium tripolyphosphate) or sodium polyacrylate derivatives.
- To upgrade the plasticity of ball clay by increment of colloidal size particle which can be done by a hydrocyclone classifier.

- The granule properties should be further studied on pore in granule or compact response in comparison to the bulk powder. Adjusting of variables has to be studied in case of unacceptable granule quality.