

CHAPTER 7



CONCLUSIONS AND RECOMMENDATIONS

1. A sequential two-stage coalescence kernel developed by Adetayo(1993) for use in the population balance model [equation(3.22),(3.25) and (3.27)] of the granulation process has been adopted here. The model follows the observed mechanism of granulation and takes into account the effect of liquid content and granulation time on the granulation process.
2. A sensitivity study on the drum granulator model [equation (3.21) and (3.27)] reveals that the results are rather insensitive to the second-stage kernel but sensitive to the first-stage kernel.
3. A sensitivity study on the screen model [equation (3.1) and (3.2)] reveals that while the product size distribution is not significantly affected by perturbations made to the screen model parameters, the oversize distribution is quite sensitive to the 'oversize screen' parameter, m_o , and the 'oversize screen' efficiency increases with m_o .
4. A sensitivity study on the crusher model reveals that in order to obtain a highly efficient crusher, some classification function has to be introduced into the crusher.
5. Simulation results obtained for the granulation process using fertilizer grade 16-16-8 reveal that increasing the liquid phase ratio will reduce the recycle ratio and that there exists an optimum recycle ratio.

The recommendations for further study are as follows:

1. The fertilizer granulation process in a real plant often includes a dryer in the circuit. Although the dryer's main role is to dry the granulated fertilizer, the rotating forces of the dryer drum could affect the particle size distribution in real life. This effect should be taken into account for more detailed study in the future.
2. The effects of adding urea, potassium chloride (KCl), potassium sulfate (K_2SO_4), filler(kaolin, sand) on the NPK fertilizer granule growth kinetics should be taken into account.
3. The drum speed is expected to have a significant effect on the granulation process. The effect of drum speed should be investigated.