CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The influence of feed compositions at 61.0, 62.9, and 65.0 wt% *m*-CNB on precipitate compositions and crystallization temperatures were studied. A mixture containing *m*- and *p*-CNB forms a eutectic mixture having a composition of 62.95 wt% *m*-CNB and 37.05 wt% *p*-CNB by cooling to 23°C. Below the eutectic composition, the precipitates by cooling to 23°C are rich in the para isomer, 91.08 wt% purity, while above the eutectic composition, the precipitates by cooling to 23.5°C are rich in the meta isomer, 89.85 wt% purity. In the feed below the eutectic composition, the effects of number of a zeolite (NaX, CaX, BaX, NaY, and CaY) on the *m*- and *p*-CNB crystallization were studied. The results show that the studied number of the zeolites does not affect the feed solution composition but has a great influence on the precipitate composition. The crystallization of the feed solution with 5 grains of the zeolites results in the precipitates with high *p*-CNB compositions than that from the solution with 10 grains of the zeolites. The precipitates near the zeolites have a purity of *p*-CNB higher than those far from the zeolites. A zeolite has considerable effects on the precipitate composition in the area far from the zeolites more than that in the area near the zeolites, especially in the feed with 10 grains of the zeolites. For the precipitates in the feed above the eutectic composition, the zeolite can shift the precipitate composition from being rich in *m*-CNB to rich in *p*-CNB. The *m*-/*p*-CNB ratio of the precipitates seems to be independent on the type of a zeolite. Moreover, the influence of seeds on the crystallization was studied. The result revealed that the presence of seeds of the material to be crystallized can induce the crystallization of precipitates following the phase diagram at that feed composition. The purity of the precipitates decreases with the increase in the number of the seeds. Zeolites and seeds have a great influence on the crystallization temperature. Zeolites can induce nucleation at a temperature lower than that requires for the crystallization without any zeolite, while seeds can induce nucleation at a

higher temperature than the crystallization temperature of the feed without any zeolite.

5.2 Recommendations

Based on what has been discovered in this study, the following recommendations are suggested:

1) The nucleation and growth rate should be considered.
2) The size of the zeolites should be controlled to investigate the effect of a zeolite clearly.
3) Factors that can influence the final crystalline product should be studied.