CHAPTER V

CONCLUSIONS AND RECOMMENDATION

In the study of factors affecting the structure of synthetic pentasil zeolites, the results were as follows :

Chemical compositions of crystals greatly effected on the crystallinity of ZSM-5 zeolites. There was found that Si/Al mole ratios which gave the highest crystallinity of ZSM-5 zeolites in the range of 20 and 200 was 140. Therefore, at high Si content, product crystals had high crystallinity of ZSM-5 zeolites and at low Si content, the product crystals had low crystallinity of ZSM-5 zeolites. Because when Si content was increased, the amounts of the gel components were increased too and they caused the nucleation of ZSM-5 zeolites which continued crystallization and growth later. But when Si/Al mole ratio was higher than 200, it became silicalite-I.

Optimum initial pressure in the range of 1 and 5 kg/cm^2(gauge) was 3 kg/cm^2(gauge). At this pressure, the product crystals were ZSM-5 zeolites and had only one phase which occured from the series reactions. And for initial pressures 1 and 5 kg/cm^2(gauge), the product crystals were mix phases of ZSM-5 zeolites and impurities which occured from the parallel reactions.

In the case of pH effect, almost of the optimum pH was about 9-11. It was observed that optimum pH decreased when Si/Al mole ratio increased as the followings :

Si/Al mole ratio	optimum pH
100	10
200	8
400	6

Optimum pH was needed to stabilize nucleus or embryo of zeolites, if OH^- concentration was excess, the nucleation and growth of ZSM-5 crystallites would have been exhibit and if OH^- concentration was low, dissolved hydroxy Si and Al species were too low to lead the nucleation of crystals.

From the study of effect of temperature rates in crystal synthesis, it illustrated that the gel phase could developed continuously to form nuclei of zeolites and then there were followed by crystallization and crystal growth which were stable at each condition finally. Because types of product crystals depended on temperature rates and times in crystallization as mentioned above, when product crystals were synthesized at heating rate 1.6 ^{o}C/min. for 5.5 hr., stable form of zeolites which performed was well-developed ZSM-5 crystallites. At lower heating rate (1.2 ^{o}C/min.), stable form of product crystal was amorphous and at higher heating rate (2.0 ^{o}C/min.), temperature and pressure were rapidly increased, therefore, another types of zeolites were stable form.

In the case of temperatures and times in calcination process, their effects on the structure of synthetic pentasil zeolites were very low. It was concluded that higher temperatures and times made higher crystallinities destruction because of thermal decomposition of catalysts but there was caused in very small amounts of crystals,so this effect was very little when compared with the other effects.