CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

In this thesis, the Cu,Al-silicate, Cu/Cu,Al-silicate, and coated Cu/Cu,Al-silicate on monolith for the selective catalytic reduction of nitric oxide with propane in the presence of excess oxygen were investigated . The conclusions of this study can be summarized as follows :-

1. Cu incorporated in ZSM-5-structure increased the light-off temperature and expanded temperature window of maximum NO conversion. Furthermore, addition of copper exchanged could improve the light-off temperature of these catalysts.

2. When copper content in Cu,Al-silicate were increased, NO conversion became higher than at lower copper content. Too high copper content, however, decreased the activity for NO conversion of Na-form and H-form of Cu,Al-silicate. On the other hand, NH_4-Cu,Al-silicate showed a slight decline of activity when copper content were increased, but the activity increased again when copper content were increased further.

3. Cu/Cu,Al-silicate showed higher activity when number of Cu ion-exchanged on Cu,Al-silicate were increased. However, activity of the catalyst

decreased when Cu were ion-exchanged 3 times on both Na-Cu,Al-silicate and H-Cu,Al-silicate.

4. SO_2 in feed stream decreased the activity of NO removal of Cu/Na-Cu,Al-silicate similar to Cu/Na-ZSM-5. Hence, copper metal could not tolerate SO_2 content.

5. The ratio of Cu/Na-Cu,Al-silicate to Al_2O_3 between 50:50 and 70:30 on monolith had small influence on the reduction of NO by propane in an oxidizing atmosphere.

6. Comparison between the pelleted catalysts and the catalyst coated on monolith, showed that, at the same WHSV, catalysts coated on monolith exhibited higher activity than the pelleted catalysts for NO reduction at the conditions used in this research.

7. Metallosilicate as ZSM-5 (Al-silicate) , and Cu,Al-silicate prepared in this laboratory by the rapid crystallization method, gave the same XRD patterns as ZSM-5 structure. This indicated that the copper aluminosilicate and copper ion-exchanged copper aluminosilicate also have the pentasil pore opening structure, the same crystalline structure as ZSM-5. Consequently, the metal loading did not change the structure of ZSM-5.

8. Copper loading did not affect BET surface areas. However, form of cation catalysts, such as Na, NH_4, and H-form, substantially affected BET surface area and pore size distribution.

From this research, the recommendations for further study can be as follows :

1. Determine the effect of copper content on the activity of Cu,Al-silicate in more detail
2. Investigate mechanism of C_3H_8 oxidation over Cu in crystal
3. Find out metals which can tolerate SO_2 better than Cu
4. Improve Cu ion-exchanged procedure to attain better catalytic activity