CHAPTER X
CONCLUSIONS AND RECOMMENDATIONS

This dissertation has described studies of the effect of severe conditions on catalytic properties of various types of metal on MFI type zeolites for NO removal with n-octane in the presence of excess oxygen. Cu/MFIs, H-Co-silicates, Cu/Co-silicates and Pd/Cu/MFIs were taken into account in this study. The conclusions of this thesis were summarized as follows:

1. Copper content loaded on MFI type zeolite affected on the activity for NO conversion. The catalyst with a higher amount of copper content exhibited a higher activity for NO conversion.
2. The presence of steam (0-10 mol%) H_2O impacted on nitric oxide removal using 200%Cu/MFI and H-Co-silicate infinitesimally even when 10 mol% H_2O was introduced in the feed gas. Therefore, 200%Cu/MFI and H-C-silicate still exhibited high activity for NO conversion.
3. The influence of thermal-treatment was also interpreted. 200%Cu/MFI lost activity for conversion of NO visibly due to the unstability of its framework of MFI type zeolite. In contrast, the activity for conversion of NO of H-Co-silicate is promoted by high thermal-treatment. The thermal-treatment condition at 1,000°C provided the optimum condition for NO conversion of H-Co-silicate. By using many characterizations, it can be concluded that after thermal-treatment at 1,000°C some cobalt species moved from the framework and changed into dispersedly cobalt oxides on the surface. Both cobalt species in the framework and those educed from the framework promote higher activity for conversion of NO.
4. Cu/Co-silicate was prepared to investigate and compare the activity for nitric oxide removal with 200%Cu/MFI and H-Co-silicate. Cu/Co-silicate exhibited higher conversion of NO than H-Co-silicate but lower than 200%Cu/MFI. However, the stability of Cu/Co-silicate is better than 200%Cu/MFI. By observing the thermal treatment condition at 1,000°C, 200%Cu/MFI loss the activity for conversion of NO as mentioned above. Cu/Co-silicate pretreated at 1,000°C showed similar nitric oxide conversion to H-Co-silicate pretreated at 1,000°C. Cu/Co-silicate pretreated at 1,000°

C exhibited higher conversion for decomposition of NO than Cu/Co-silicate without pretreatment. It can be implied that most copper species loaded on H-Co-silicate pretreated at 1,000°C is Cu^{1+} species promoting high decomposition of NO.

5. The hydrothermal-treatment deactivated both 200%Cu/MFI and H-Co-silicate more severely than either hydro-treatment or thermal-treatment.
6. Pd group metals can maintain the active Cu^{2+} species for NO conversion against hydrothermal-treatment at 800°C with 10%H_2O. Pd plays an important role to spillover oxygen to copper species preserving active Cu^{2+} species for NO conversion in lean burn condition.

From this research, the recommendations for further study can be as followed;

1. Investigate Cu/Co-silicate catalyst in thermal-treatment and hydrothermal-treatment conditions. The copper and cobalt content should be continued studying.
2. Improve the activity of Cu/MFI by loading various amounts of Pd species. The effect of Pd loading should be studied to see if is necessary to preserve all Cu^{2+} enable to resistant to hydrothermal-treatment condition.