CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

In this thesis, new bimetallosilicates having MFI structure, Co,Al-silicates, were synthesized and investigated for the performance in NO removal by selective catalytic reduction with methane in the excess oxygen. The conclusion of this study can be summarized as follows:

1. Co,Al-silicates in H-form exhibited high activity for NO conversion but Co,Al-silicates in Na-form showed very low activity for NO abatement.
2. NO conversion of H-Co,Al-silicates increased with cobalt content incorporated into the framework with broadening the effective reaction temperature window to elevated temperature.
3. Comparison with Co/H-ZSM-5, Co,Al-silicate showed the similar NO conversion activity but lower activity for methane conversion, indicating the higher selectivity of new catalyst.
4. With the same amount of cobalt, H-Co,Al-silicates had lower acidity than Co/H-ZSM-5.
5. The presence of sulfur dioxide, exposing to H-Co,Al-silicate affected in the positive NO conversion at 550 °C, like to Co/H-ZSM-5 but caused only little impact at 400 °C on conversion of NO, contrary to the strongly negative effect on Co/H-ZSM-5.

6. Selective catalytic reduction of NO over Co,Al-silicate either Na-form and H-form can be improved by addition of some metal cation such as cobalt using ion exchanging.
7. With the same amount of cobalt, Co/H-Co,Al-silicates shows the highest NO reduction among H-Co,Al-silicate and Co/H-ZSM-5 catalysts due to the enhancement of methane oxidation by cobalt cationic sites.

As new catalysts, Co,Al-silicates now are not clear in the actual mechanism even the reaction rate and the durability of these catalysts have not been investigated in many situation such as with the presence of inhibitor, generally known, water vapor or others poison species or in the higher temperature condition. The knowledge of nature and deactivation behaviors as well as the mechanism of catalysts can lead to the improvement in its activity. Further studies are recommended below

1. the mechanism study by coke investigation which can imply the deactivation of catalysts
2. the enhancement study by modifying the other metal ion-exchanged
3. the isotropic study for determination the reaction rate, rate determining step and also the reaction mechanism
4. The in situ monitoring for scanning the intermediates which conduct to the postulation of the mechanism
5. The improvement technique by higher bi-functional cooperating