

CHAPTER VI

CONCLUSIONS AND RECOMMENDATION

In this research, the reaction mechanism of the selective catalytic reduction of NO by hydrocarbon over Pt/Al₂O₃ catalyst under lean-burn condition is proposed via the investigation of surface species produced on the catalyst surface. The conclusions of these results are summarized as follows:

1. Both the introduction of NO in the reactant feed and the change of the feature of surface oxygen similarly result in the shift of C₃H₆ oxidation curve. But their effects on the nature of surface species formed are different. The new nitrogen containing species are produced in the presence of NO whereas the types of surface species are not different when the characteristic of surface oxygen is altered.

2. At least three types of surface species, which are addressed as C_xH_yO_zN_w, (C_iH_jO_k)_{LT} and (C_lH_mO_n)_{HT}, occur on Pt/Al₂O₃ catalyst for C₃H₆+NO+O₂ reaction.

3. The observation of the reactivity of surface species to various oxidizing gases and the investigation of the nature of surface species after the addition of sulfur dioxide in the reactant feed indicate that a few mechanisms are simultaneously proceeded at the same reaction condition.

4. The investigation of surface species after adding the second metal (Li, Cr, Fe, Ni, Ga, Co, Sn, or W) on Pt/Al₂O₃ catalyst indicate that only (C_lH_mO_n)_{HT} species distinctly play an important role in C₃H₆+NO+O₂ reaction at low operating temperatures.

5. The investigation of surface species for C₃H₈+NO+O₂ reaction by temperature programmed technique in this work can not explain the reaction mechanism due to the obtained surface species behaving as the spectator species.

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

1. To confirm the proposed mechanism for $C_3H_6+NO+O_2$ reaction, the other techniques should be simultaneously used.

2. To employ extensively the investigation of surface species by an experimental set of three continuous steps for the prediction of reaction mechanism, other reactions should be tested, especially the reaction involving the ambiguous mechanism.

3. To develop the catalytic performance of Pt/Al_2O_3 catalyst, the detailed information about the effect of each second metal should be profoundly studied. Examples are the improved catalytic activity in $C_3H_6+NO+O_2$ reaction by the addition of Li and the increase of N_2 production in $C_3H_8+NO+O_2$ reaction by the introduction of W.



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