

## CHAPTER VI

### CONCLUSION AND RECOMMENDATIONS

From this investigation, it was found that there are many effects to the performance of the modified three-way catalyst. Variations of these effect can be summarized as follows:

1. From the result of catalyst screening, it was found that the atomic mass ratio of loaded metal related to the light-off temperature of NO to N<sub>2</sub> conversion. The palladium-cobalt catalyst seems to behave similarly to the conventional three-way catalyst.

2. The ratio of Pd/Co affected the catalytic efficiency. The highest activity for NO reduction, CO and propane oxidation is obtained from 0.03 wt%Pd to 0.03wt%Co catalyst.

3. The calcination under reducing atmosphere (10%H<sub>2</sub>/N<sub>2</sub>) at high temperature could induce SMSI phenomenon to occur. Because of the SMSI effect, the efficiency of NO conversion is dramatically enhanced but NO conversion is inversely affected.

4. Temperature program reduction is one method which can indicate the activity of catalyst by monitoring the strength of adsorbed oxygen on the catalyst surface. The lower strength of oxygen adsorption the high catalyst activity.

5. The pretreat by exhaust gas is a method which can be used to activated the catalyst. In this studied, it was found that the treatment enhanced CO oxidation and propane oxidation, but there is no effect on NO reduction.

6. The window performance of modified three-way catalyst exhibits similarly to the conventional three-way catalyst. The catalyst is active in the vicinity of stoichiometric point ( $S=1.0$ )

And in this study the following crucial concepts may be concluded.

1. The replacement of the conventional three-way catalyst by modified one was scientifically searched by adopting the atomic mass ration as the parameter for catalyst selection. The modified three-way catalyst studied here, Ce-Co-Pd, was in the same group with the approximately same atomic mass ratio to that of the conventional one.

2. It has been found that the state of partially mixed metal catalyst, reflected by the early decrease in metal site, was required to exert the highest activity for NO conversion.

3. The active catalyst for NO conversion should have the TPR profile in the vicinity of that of the conventional catalyst whose TPR profile was in the range of 200-230°C. That means the active catalyst should have  $O_2$  desorbed at considerably low temperature from which the competitive adsorption of NO to  $O_2$  was favorably affected.

The recommendation for further study are as follow :

1. It is well-known that the exhaust gas produced from an automobile engine always fluctuate between rich and lean mixture, therefore, the behavior of the modified catalyst during cyclic operation should be investigated

2. Although the unleaded gasoline have been proposed to use for the three-way catalyst system. The impurity in fuel or lubricating oil such as sulfur, phosphorus and small amount of lead might effect the catalytic activity. For this reason, the stability of the catalyst should be investigated to assume the stability of the modified catalyst.