

CHAPTER V

CONCLUSIONS

5.1 Conclusions

Silver and gold on alumina which were used as a catalyst for NO reduction and CO oxidation in a differential flow reactor was prepared using impregnation and coprecipitation techniques. At 5% (by weight) loading of total metal, the Ag/Au ratios which were 0%Ag, 25%Ag, 50%Ag, 75%Ag and 100%Ag were studied. The impregnation catalyst of 25%Ag and the coprecipitation catalyst of 100%Ag were suitable for NO reduction and CO oxidation. The other ratios from both methods responded to NO decomposition.

To study the effect of calcination temperature, the impregnation catalyst of 50% Ag was calcined at 200, 300, 400, 500, 600, and 700°C. The higher calcination temperature was good for only NO decomposition.

All of the catalysts were characterized by BET, TEM, and XRD. The results showed that the effects of calcination temperature and Ag/Au ratio have no strong effect on BET surface area, pore volume and pore radius. The catalysts from coprecipitation method gave the surface area less than the catalysts from impregnation method. Furthermore, there was a wide distribution of crystallite size and sintering of the metal.

The impregnation catalyst of 25%Ag and the coprecipitation catalyst of 100%Ag were studied to determine the kinetics of NO reduction and CO oxidation. To find the order with respect to NO concentration, the CO concentration was kept at 20,000 ppm and NO concentration was varied from 2,000 to 3,500 ppm. The NO orders which used the impregnation catalyst of 25%Ag and the coprecipitation catalyst of 100%Ag are 0.55 and 0.04 respectively. For the order with respect to CO concentration, the CO concentration was varied from 500 to 2,000 ppm. The CO orders, at the constant NO concentration of 10,000 ppm, are found to be 0.56 for the impregnation catalyst of 25%Ag and 0.33 for the coprecipitation catalyst of 100%Ag.

The activation energies of NO reduction and CO oxidation for the impregnation catalyst (25%Ag) and the coprecipitation catalyst (100%Ag) are 11 and 6.4 kcal/mole respectively. However, both catalysts are suitable for NO reduction and CO oxidation.

5.2 Recommendation

Since the coprecipitation catalysts gave very high activities at the beginning of the reaction time, while rapidly decreased after 100 minutes of reaction time due to the deactivation, it is recommended that further study of the causes of sintering should be carried out. If one can prevent the catalyst from being sintered, one can prepare a highly active catalyst. The decomposition activity of the catalysts also needs further investigation.