CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this study were as follows :

1. It was found that high temperature calcination in a reducing atmosphere caused a beneficial effect (SMSI effect) and the effect was stronger for higher calcination temperatures.

2. CO_2 adsorbable strength, which was defined as the temperature that CO_2 gave a maximum desorption, played an important role on the catalytic behavior of the catalysts which was prepared by the method used in this study.

3. SMSI effect of copper on alumina support could not be induced by platinum at the calcination temperature of 500 °C and in reducing atmosphere. On the other hand, only high temperature reduction (HTR) can induce SMSI effect in copper supported on alumina.

4. Copper catalyst for CO oxidation reaction can be improved by the incorporation with platinum. Synergistic effect was observed in the bimetallic catalyst.

5. In preparatory step, order of metal impregnation is important to achieve the best catalyst and the best order of impregnation found in this research is the impregnation with platinum prior to copper. It was also found that the optimum

conditions for the preparation of platinum incorporated copper catalyst used for the oxidation of carbon monoxide were as follows :

(i) Calcined of the platinized alumina in air at the temperature of 500 °C for 4 hours.

(ii) Re-impregnation with the solution of copper nitrate followed by the calcination of the impregnated material at the temperature of 500 °C for 7 hours under reducing atmosphere of H_2+N_2.

6. Enhancement of catalytic activity of platinum incorporated copper catalyst was caused by the following two postulations :

(i) Due to the augmentation of Cu surface active sites which was induced by a process of alloy formation between platinum and copper.

(ii) Due to the phenomena similar to SMSI phenomena caused by the interaction between platinum and copper.

From this study, the recommendations for further research are as follows :

1. Attempts to study the SMSI effect of copper catalyst in other hazardous exhaust gas e.g. nitric oxide, low molecular weight hydrocarbon etc.

2. Study should be made on the SMSI catalysts or bimetallic alloy catalysts by further characterization method.

3. Study of copper or platinum incorporated copper catalysts should be made on other supports such as any kind of zeolite.