# CHAPTER VI

## CONCLUSION AND RECOMMENDATIONS

From this investigation, it was found that there are many effects to the copper catalyst performance of methanol synthesis. Variations of these effects can be summarized as follows :

1. Type and amount of metal oxides which act as promoter in this experimental effected the catalytic performance by increasing more than cu catalyst without promoter containing.

2. The highest activity for Cu catalyst with metal oxides was found in composition of 1%Ce/1.31%Cu.

3. It was found that pressure has a considerable effect on catalytic performance in which methanol yield decrease as decreasing pressure.

4. Commercial catalyst was found to exhibit high activity for methanol formation than in-house catalysts base on copper. In the pulsing injection of $N_2O$, It was found that the catalytic performance was increased and it showed similar results to ZN1 (2%Cu 12%Zn).

5. Other copper catalysts with metal oxides promoter except Zn in the presence of $N_2O$ showed lower catalytic performance than no $N_2O$ containing catalysts.

When changing to pulsing air instead of $N_2O$ and measured methanol after injection air for 60 seconds, it was found that methanol yield was increase as agreė with Jennings [31] which investigated by other catalysts.

**Recommendations**

The recommendations for further study are as follows :

1. It was well known that, $N_2O$ effected to the activity of methanol synthesis in term of surface oxidation. The other method of catalysts preparation such as incipeient impregnation should be investigated for comparison.

2. Although the $N_2O$ effected to the catalytic performance. The conditions (such as; temperature, time amount ,frequency etc.) of injection and measurment of methanol should be investigated.