

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The selective oxidation of propylene to propylene oxide using gold catalysts on various types of supports was investigated. From the results, it can be concluded as follows:

1. Gold catalyst activity strongly depended on the type of metal oxide supports

- Au/ZnO catalysts were not selective to PO but enhanced only hydrogenation at all investigated percentages of gold loading

- Au/Al₂O₃ catalysts were slightly selective to PO and gave very low PO production rate at all investigated percentages of gold loading

- Au/TiO₂ catalysts by the SG method gave high selectivity to PO ranging from 31.44 to 95.38%. In addition, 1% Au/TiO₂ catalyst gave the highest PO production rate of 0.401 mmol/h/g.cat with selectivity of 85%.

2. For Au/TiO₂ catalysts prepared by both the SG and DP methods, it was found that for the best operating condition

- catalysts should be calcined at 400°C

- feed composition consisted of 10% C₃H₆, 10% O₂, and 10% H₂

- reaction temperature should be at 80°C.

The Au/TiO₂ SG catalyst gave both higher selectivity and PO production rate than the Au/TiO₂ DP catalyst.

3. It was also found that 1% Au/TiO₂ SG catalyst was twice more activity in the terms of PO production rate than the 1% Au/TiO₂ DP catalyst studied by Hayashi et al (1998).

The catalytic activity of Au/TiO₂ on different types of TiO₂, such as titanosilicate, with different percentages of gold loading is recommended to be carried out at different space velocities, and feed stream compositions.

Different types of oxygen carrier gas, for example, NO, or CO, introduced into the system should also be investigated.