CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The comparative activity tests showed that the TiO_2 (SG) exhibited much higher cyclohexene conversion and cyclohexene oxide selectivity than the other oxide catalysts. The RuO_2 additive was loaded onto this TiO_2 (SG) by IWI and SSSG method. It was found that 1 mol% RuO_2/TiO_2 (IWI) calcined at 550°C for 4 h showed higher catalytic activity with satisfactory cyclohexene conversion and cyclohexene oxide selectivity. The optimum reaction conditions—reaction temperature of 70°C, catalyst amount of 0.5 g, and H_2O_2-to-cyclohexene ratio of 1—gave 47.07% cyclohexene conversion and 88.50% cyclohexene oxide selectivity after 5 h. In addition, the recyclability test for three catalytic reaction cycles was investigated. It was found that 1 mol% RuO_2/TiO_2 (SSSG) calcined at 550°C for 4 h is stable and can be re-used in at least three cycles when compared with RuO_2/TiO_2 (IWI). The RuO_2/TiO_2 (SSSG) was then taken to study the effect of calcination temperature in order to improve the catalytic activity of cyclohexene epoxidation. It was found that RuO_2/TiO_2 (SSSG) calcined at 450°C for 4 h provided the highest both cyclohexene conversion and cyclohexene oxide selectivity.

5.2 Recommendations

In order to further improve the activity of the synthesized mesoporous-assembled TiO_2, other metal oxide additives, such as ReO_4, Re_2O_7, and Nb_2O_5, are also interesting since they are more cost-effective.

The recyclability of the RuO_2/TiO_2 (SSSG) should be further evaluated.