CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this research, the synthesized mesoporous-assembled TiO_2-CeO_2 mixed oxide catalysts were synthesized by a sol-gel method with the aid of a structure-directing surfactant and were comparatively used for liquid-phase cyclohexene epoxidation. The TiO_2-to-CeO_2 molar ratio in the mixed oxide catalysts had significant effects on the catalyst properties and cyclohexene epoxidation activity. The incorporation of CeO_2 with a suitable content to the TiO_2 significantly increased the specific surface area of the synthesized mesoporous-assembled TiO_2-CeO_2 mixed oxide catalyst and increased the number of surface OH groups available for the cyclohexene epoxidation reaction, which could enhance the epoxidation activity. The comparative activity tests showed that the synthesized mesoporous-assembled $0.98TiO_2$-$0.02CeO_2$ mixed oxide catalyst calcined at 500 °C gave the highest cyclohexene oxide selectivity. The optimum H_2O_2-to-cyclohexene molar ratio and catalyst-to-reaction volume ratio were found to be 0.25:1 and 3.33 mg/ml, respectively, providing a maximum cyclohexene oxide selectivity of 70.1% after the reaction time of 5 h.

5.2 Recommendations

In order to further improve the cyclohexene epoxidation activity, other porous materials, especially zeolites with different pore openings, are also interesting to be employed in combination with the mesoporous-assembled TiO_2 and TiO_2-CeO_2 mixed oxide.