

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The conclusions of the present research are the following:

1. The preparation of Co-TS-1 catalysts by using different parameters (types of cobalt salt and loading solutions) affect on the extent of titanium and cobalt that can incorporate into framework. However, the formed catalysts can still maintain MFI structure and orthorhombic crystal shape.
2. The majority of cobalt metal only offered to the gel solution can incorporate into the solid zeolite catalyst structure.
3. The types of cobalt salts (nitrate, chloride, acetate) influenced on the amount of incorporated cobalt because the high pH value of cobalt salt as a base is suitable for cobalt loading.
4. The Co-TS-1 plays role as an effective catalyst and high stability for 2-propanol oxidation reaction in gas phase. Furthermore, the oxidation property of the Co-TS-1 catalysts depend on the amount of titanium and cobalt.
5. Higher amount of cobalt that incorporated in TS-1 framework will increase weak acid sites ratio on catalyst surface. Therefore, the amount of cobalt concentration promotes the high ability for the dehydration to propylene rather than the oxidation to acetone in both catalytic activity and product selectivity.
6. The reaction temperature is one factor, which influences on the conversion and product selectivities.

6.2 Recommendations for future studies

From the previous conclusions, the following recommendations for future studies can be proposed.

1. Some compound or transition state of cobalt on catalyst surface which may effect on acid site and any reason for unusual behavior of Co-TS-1 have to be further investigate by ESR and XPS techniques

2. More characterization techniques each as X-ray absorption at fine structure (EXAFS) which can be used to investigate the environmental amorphous phase and small metal particle.

3. Because the acid property influences the catalytic property, therefore the role of Brönsted Lewis acid site should be further studied.

4. Reaction time during crystallization should be varied to investigate composition ratio of cobalt and titanium in the synthesized catalyst because it may be another parameter that affect on the incorporated metal.

5. The preparation of Co-TS-1 catalysts by ion-exchange, impregnation, deposition-precipitation and cogellation methods should be determined.

6. Study the efficiency of Co-TS-1 catalyst in other reaction such as hydrogenation and selective hydroxylation of benzene to phenol and investigate the oxidation property on ether alcohol such as unsaturated alcohol or glycol.