

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The conclusions of this research are summarized as follows:

1. The sequence of magnesium loading affects the structure of V-Mg-O/TiO₂ catalyst.

2. From the results of XRD, the crystalline V₂O₅ is observed on the catalyst which magnesium is first impregnated (MgVTi) on TiO₂ support while it is not detected on catalyst which vanadium is first deposited (VMgTi) or vanadium and magnesium is co-impregnated (co-5VMgTi).

3. The main desired product obtained from the propane oxidation reaction is propene. The sequence of magnesium loading has an effect on propene selectivity. The order of increasing in propene selectivity is the following:



4. Increasing magnesium content can improve the propene selectivity while the increase of vanadium oxide content enhance the activity of the catalysts.

5. Since the selectivity to propene and CO₂ in the propane oxidation is rather constant over the range of the reaction temperature proposed that both propene and CO₂ are produced directly from propane.

6. From propene oxidation, V-Mg-O/TiO₂ catalyst is quite inactive in this reaction. This confirms that propene produced in the propane oxidation is not

further oxidized to CO₂.

7. In the 1-propanol oxidation reaction, propanal is a major product at low temperature and is further oxidized to CO₂ while propene is produced directly from 1-propanol by dehydration reaction. The consecutive reaction of propene to CO₂ is very low.

8. The sequence of magnesium loading and magnesium content seem to have no effects on the catalytic performance of the catalysts in the 1-propanol oxidation reaction. In contrast, vanadium oxide can promote the propene selectivity, the more amount of vanadium oxide, the more the propene selectivity.

9. V-Mg-O/TiO₂ is quite inactive for the CO oxidation reaction. In the propane, propene and 1-propanol oxidation reactions, CO is an unobservable product. Thus, it is ensured that CO is not produced in these three reactions.

6.2 Recommendations for future studies

1. In addition to propane, the V-Mg-O catalyst has also been reported to be a selective catalyst for the oxidative dehydrogenation of butane. Moreover, it used to be tested in the higher hydrocarbon molecule reaction such as pentane. Therefore it will be interesting to further study the oxidation property of the V-Mg-O/TiO₂ catalyst in the higher alkane molecule oxidation such as butane and pentane.

2. From the above conclusions, the amounts of vanadium and magnesium play an important roles on the catalytic property of V-Mg-O/TiO₂ catalyst. A more wide variation of the vanadium and magnesium content will be used to find the optimum content which give the best catalytic performance for each reaction.