CHAPTER V

CONCLUSION

In this study, three different methods of synthesis of Al-MCM-41 were investigated. The Al-MCM-41 catalyst with various Si/Al ratios were successfully synthesized using two-temperature synthesis method under basic condition that provides the highly ordered Al-MCM-41 with Si/Al ratio close to the loaded value. The procedure is heating the starting gel at 100°C for 2 days, pH adjustment to the value of 9.5, and subsequently heating at 125°C for 6 days. XRD patterns of Al-MCM-41 similar to that reported by Beck [33-34] and the increase of aluminum content results in a decrease in intensity of XRD peaks. From ^{27}Al-NMR data, the aluminum atoms mainly locate at the framework site rather than at the non-framework site. The N_2 adsorption-desorption isotherms also revealed that all samples exhibit a well-expressed hysteresis loop of type IV and the specific surface area in the mesopores decreases with increasing aluminum content due to some destruction of the pore structure. NH_3-TPD profiles shows the presence of Brønsted acid sites. With increasing the aluminum content, resulting in the decrease of Si/Al ratio, causes the increase in peak area corresponding to the amount of desorbed ammonia.

The Al-MCM-41 catalyst was tested for catalytic degradation of polypropylene at various temperatures. It was found that Al-MCM-41 is a very active catalyst for degradation of polypropylene with high conversion of 97-100%. At the temperature of 550°C, gas products are mainly obtained from polypropylene degradation with 100% conversions of polypropylene. Formation of *iso*-butane is favored at the temperature of

350°C while further conversion of *iso*-butane to propylene takes place effectively at higher temperatures. Methane is formed in a small amount but increases at higher temperatures. Highly dispersion of Brønsted acid sites on the large catalyst surface is accounted for the high catalytic activity of Al-MCM-41. Values of %conversion and product selectivity are slightly changed with increasing Si/Al ratio in catalyst. Formation of coke deposited in catalyst is significantly decreased with increasing Si/Al ratio in catalyst.

The suggestion for future work

1) Varying type of catalysts such as zeolite, other mesoporours materials for catalytic degradation of polypropylene and comparing catalytic activity with Al-MCM-41 at the same condition.
2) Determining catalytic activity in degradation of other plastic wastes, for example polystyrene.