CHAPTER V

CONCLUSIONS

Modified mesoporous molecular sieve, Al-SBA-15, has been synthesized by using the post synthesis alumination method. XRD patterns of these catalysts show the characteristic peaks of hexagonal structure. The intensity of the reflection peaks increase when the Si/Al ratio increases. Adsorption-desorption isotherm of nitrogen on Al-SBA-15 exhibits a pattern of type IV with the present of H1-type hysteresis loop which is typical sorption isotherm of mesoporous equipped with micropores. The specific surface area in the mesopores increases with the decreasing of aluminum content similar to the wall thickness of the catalysts. Morphology of the solid products is a uniform rope-liked particle according to SEM images. In addition, ^{27}Al-MAS-NMR spectra confirm that all of the aluminum atoms detecting from ICP-AES technique remain in tetrahedral site at framework positions. The number of acid sites decreases when aluminum content in catalyst decreases.

The cracking of waste from biodiesel production (WBP) which consists of 37.18% glycerol, 6.49% ash, 1.85% water and 54.48% matter organic non-glycerol at pH 10.47 with the density of 1.03 g/mL has been successfully promoted by Al-SBA-15 in a liquid-phase catalytic reaction. The results show the catalytic cracking of the WBP process depended on physical properties of the catalysts and chemical properties of WBP. %Conversion and %yield of product by catalytic cracking are greater than pyrolysis when the reaction temperature is increased from 350°C to 450°C. The optimum condition for WBP cracking is the reaction temperature of 400°C, and catalyst amount of 10% by weight to WBP performing over 70.0% conversion, whereas only 57.5% conversion was observed in pyrolysis. The major products are similar in all conditions consisting of 1,3-butadiene and CO_2 for gases products and 2-cyclopenten-1-one for liquid product. However, the catalyst from liquid-phase catalytic reaction cannot be regenerated because of the alkali starting material. The first regenerated catalyst of Al-SBA-15(100) from vapour-phase catalytic reaction exhibits the characteristic properties and catalytic activity close to the fresh Al-SBA-15(100) catalyst, whereas the second regenerated performs less about 3% conversion.

The suggestion for future work

1. Study the optimum condition of the vapour-phase catalytic cracking of WBP using Al-SBA-15 with various Si/Al mole ratios for avoidance contacting the base-starting material.

2. Investigate the optimum condition for the catalytic activity of this catalyst in cracking of WBP over alkali catalyst Al-SBA-15 (Na^+ form) using liquid-phase catalytic reaction because this catalyst might resist the alkali starting material and regenerated for the next reaction.

3. Test the catalytic activity of this catalyst in cracking of WBP from other resource which consists of different composition.