

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The results indicated that the two-stage pretreatment combined with microwave radiation on corncobs was effective method to enhance enzymatic hydrolysis accessibility by removing lignin and hemicellulose. Moreover, The two-stage pretreatment of corncobs has been well performed with the response surface methodology (RSM). The model equation indicated that temperature and solid-to-liquid ratio in second stage pretreatment were significant factors for glucose concentration. The optimum conditions were found at 2 % NaOH at 100 °C for 30 min, and SLR 67 in first stage followed by 1 % H₂SO₄ at 156 °C for 16 min, and SLR 106. The predicted value of glucose concentration was 45.66 g/l while the confirmation experiment was obtained the glucose concentration 48.58 g/l under the optimal condition. And 78.71 g/l of total sugar including glucose, xylose, and arabinose was released.

For the ABE fermentation process, the optimum technique that could be used was the overliming process combined with diluted 4 times hydrolysate (D4O) technique at 37 °C for 48 h. That gave the highest ABE yield of 0.41, % productivity of 17.56 g/l·h. It can be concluded that the dilution and overliming process can reduce fermentation inhibitors, increase cell growth and improve ABE yield. The results indicate that via ABE fermentation, corncobs can be used as a successful substrate because ABE yield from this technique was higher than that from synthetic sugar.

5.2 Recommendations

Because *Clostridium beijerinckii* TISTR1461 which used to produce ABE was anaerobic bacterium; therefore, the purging with nitrogen gas in order to remove oxygen gas before ABE fermentation is necessary step to improve the cell growth and ABE concentration.

Alternative design the ABE fermentation process to avoid the problem caused by inhibitors was using Simultaneous Saccharification and Fermentation (SSF) or by using fed-batch or continuous cultivation rather than batch process (Olofsson *et al.*, 2008).