

CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The optimization of aqueous ionic liquid pretreatment of rice straw with microwave heating by the response surface methodology (RSM) was found to be 50% [EMIM][Ac] at 162 °C for 48 min. The predicted value of total sugar concentration was 21.58 g/L while the confirmation experiment was obtained the actual total sugar concentration of 19.59 g/L under the optimal condition. When compared the optimal condition of aqueous ionic liquid pretreatment to acid (HNO₃), alkali (NaOH) pretreatment and untreated sample, the results showed that chemical pretreatment process can enhance fermentable sugar production by remove lignin and hemicelluloses which were the barrier of enzymatic accessibility. The highest total sugar concentration (22.32 g/L) was presented via alkali pretreatment. However, the ionic liquid pretreatment can give a comparable yield to alkali pretreatment indicating ionic liquid had a potential to be a pretreatment medium for rice straw.

For ABE fermentation, the highest ABE concentration (6.35 g/L) was found in hydrolysate from NaOH pretreatment but the highest yield (0.47) was observed from sugar derived by ionic liquid pretreatment whereas liquid fraction from HNO₃ pretreatment could not present the amount of ABE. It indicated that the high total sugar concentration was not necessary to produce high amount of ABE due to some inhibitors in hydrolysate from chemical pretreatment can cause a toxicity to microorganisms in fermentation step.

5.2 Recommendation

Some inhibitors that can cause the negative effect leading to a reduction the yield of total sugar and ABE concentration should be avoided by using detoxification methods or using Simultaneous Saccharification and Fermentation (SSF).