

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Immobilized cell fermentation on brick and zeolite can significantly enhance ABE fermentation especially butanol production which increased about 9.5 and 62.0 percentages higher than free cells mobilized, respectively. The immobilized cells on brick could increase the cell density and cell tolerance without any effect to the medium pH. Zeolite has buffering capacity and strong adsorptive binding forces between bacterial cells and zeolite surface property that can enhance the ABE fermentation. However, the immobilized cell fermentation on activated carbon showed the low butanol production and total ABE, resulting from the acidity property from activated carbon, which strongly affected to the microorganism. The SEM figure demonstrated that the cells had attached on the materials surface and porous through adsorption. The stability of cells production was investigated by repeat batch fermentation with cell immobilization on zeolite. It is clearly seen that an efficient for long term butanol production was obtained without significant decline of production.

5.2 Recommendations

For the future work, the optimal condition for activated carbon treatment to maintain the pH medium condition that proper for cell growth and well solvent production should be studied. The initial pH of different types of carbon materials to demonstrate the appropriate condition of each type of carbon materials, which could enhance the ABE fermentation, should be investigated.