

## CHAPTER 5

### CONCLUSIONS

#### 5.1 Conclusions

##### 5.1.1 Efficiency of Plant in Ethylbenzene Removal and Degradation

Three plants could remove 5 ppm ethylbenzene. *Z. zamiifolia* is an ornamental plant that is appropriate for treatment of ethylbenzene in contaminated air because *Z. zamiifolia* could remove 5 ppm of ethylbenzene completely within 60 hours. Within 12 hours, *Z. zamiifolia* leaf and stem can remove 5 ppm ethylbenzene 26% and 16%, respectively. Leaf and stem remove ethylbenzene increasing about 45% and 20%, respectively without 24 hours. Ethylbenzene might be absorbed by leaf and stem and then transported to root, including tuber. Ethylbenzene might be degraded to 1-phenylethanol and acetophenone in leaf, stem and root.

##### 5.1.2 Enhancing Ethylbenzene Removal by Microorganisms

Microorganisms isolated from leaf of *Z. zamiifolia* and contaminated soil were found such as *P. aeruginosa*, *P. putida* TISTR1522, *B. cereus* E33L, *Bacillus* sp. N6, *Bacillus cereus* strain ZQN5 and *Bacillus* sp. 6B254-3L. After inoculating microorganisms on the leaf of *Z. zamiifolia*, the result showed that these microorganisms had high efficiency to remove ethylbenzene. Especially, *P. aeruginosa* and *B. cereus* strain ZQN5 were the best microorganisms to uptake ethylbenzene constantly because they took less time than other microorganisms. The result was confirmed by investigating the rate of ethylbenzene removal of these two microorganisms on nutrient broth containing ethylbenzene. *P. aeruginosa* can remove 520 ppm of ethylbenzene at a very high rate 26.09 ppm/hour while the rate of *Bacillus cereus* ZQN5 was about 19.1 ppm/hour. This result indicated that *Pseudomonas aeruginosa* is the best microorganism to remove ethylbenzene in contaminated air. Therefore, *Z. zamiifolia* is appropriate plant for treatment of ethylbenzene. Thus, the contribution of plants and microorganism-associated leaf of *Z. zamiifolia* is an alternative method to cleanup air pollution effectively.

#### 5.2 Suggestions

1-phenylethanol and acetophenone, which is soluble in chloroform, are plant metabolites that were expected to be found. This study used chloroform for plant extraction. However, ethylbenzene is slightly soluble in chloroform, so it's necessary to find other appropriate solvent that could extract ethylbenzene and its metabolites effectively. The plant metabolites from HPLC and GC-MS analysis showed possible chemical metabolites from ethylbenzene degradation in the treated plants. Moreover, to confirm the result, the radiolabeling isotope is needed to study the ethylbenzene degradation pathway in plants.