

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This thesis is focused on the removal of silica, which is the catalyst support for producing the Single Walled Carbon Nanotubes. The experiment was separated into two parts. The first part was the dissolution of silica using TETA or NaOH. The second part was to use froth flotation process to further purify and concentrate the AP-SWNTs.

For the dissolution of pure silica with TETA, the optimum conditions were found at 250 mL TETA, 70°C and 3 hours of reaction time with the maximum silica dissolution of 77%. The silica dissolution decreased with increasing temperature when a temperature was greater than 70°C since TETA is decomposed at high temperature. For the case of NaOH, the complete dissolution of pure silica was found at 1 M which is corresponding to the theoretical requirement.

For the study of purification of the AP-SWNTs, the silica dissolution step and froth flotation were used. The optimum pretreatment conditions were found at 250 mL TETA, 70°C and 3 hours of sonication with the maximum carbon purity of 32.91%. The carbon purity increased with increasing TETA volume since an increase in TETA quantity simply increases the dissolution of silica. For the pretreatment with NaOH, the maximum carbon purity of 56.29% was found at 10 M NaOH, 70°C and 3 hours of sonication. After the TETA pretreatment and froth flotation, the maximum purity of carbon was 55.67%. Whereas the case of the NaOH pretreatment with froth flotation, the maximum purity of carbon was 72.74%.

5.2 Recommendations

The dissolution of silica could be improved by using the vacuumed pump to decrease the decomposed temperature of TETA. However, it can be increased only 4 wt%.

The dissolution of silica by NaOH, the left solid must be washed until the pH was neutralized. Because of the carbon dioxide can be reacted with the alkaline to be sodium carbonate. Therefore, the weight of left solid was more than the undissolved silica.

The purification method, which sonicated prior the froth flotation method were done. The purity of SWNTs can be increased by varying the parameter of froth flotation process. For examples, the concentration of surfactant, the type of surfactant, the flow rate and the foam height.