

## CHAPTER V

### CONCLUSION

#### 5.1 Conclusion

The mixed mode RP/WAX phases were prepared via sol-gel process and then post-modified with 2 methods of modification which are one-step ( $C_{18}$ -AP column) and two step ( $C_{14}$ -amine embedded column) modification columns. Both columns provided comparable of the permeability ( $7.65 \times 10^{-14}$  m<sup>2</sup> for  $C_{18}$ -AP column and  $7.36 \times 10^{-14}$  m<sup>2</sup> for  $C_{14}$ -amine embedded column). From the correlation of the permeability, pore size and skeleton size, it can proximate that both columns had 1.0  $\mu$ m of skeleton size, 2.0  $\mu$ m of macropore size and 7.9  $\mu$ m of HETP.

Chromatographic behaviors of  $C_{18}$ -AP column and  $C_{14}$ -amine embedded column were evaluated by Tanaka's test. The  $C_{18}$ -AP column illustrated a good hydrophobicity, unique shape selectivity, an improvement of peak tailing and enhanced retention of some acidic compounds comparing to the  $C_{14}$ -amine embedded column. It can be more explained with the results of separation performance of several mixtures (alkylbenzenes, benzoic acids, halobenzoate anions, basic compounds and PAHs). The low hydrophobicity on  $C_{14}$ -amine embedded column was ensured with the low retention of all test probes which were explained by reversed phase mechanism. For shape selectivity, it was not clearly difference between  $C_{18}$ -AP column and  $C_{14}$ -amine embedded column but the results on PAHs separation showed the difference of slot size on the phase. Due to the presence of unreacted spacer in  $C_{14}$ -amine embedded column which caused the unpredictable interaction, some acidic compounds displayed a longer retention and basic compounds displayed a peak tailing. However, both columns were not significant difference in separation performance except ion exchange interaction which occurs from the unpredictable interaction from the unreacted groups and hydroxyl groups.

#### 5.2 Suggestion of future work

Due to the unpredictable interaction of the two-step modification column ( $C_{14}$ -amine embedded column) can occur from the uncompleted reaction of amine embedded group. However, the separation performances of the two types of

method were comparable. Thus, an alternative method of modification of the polar embedded column via one-step reaction should be studied. More experiment with other modification methods of column should be required to gain the best suited RP/WAX phase for a given situation.

