CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

A continuous purge and trap, which interfaced continuous purging with a microtrap injection system was developed as an instrumentation for on-line monitoring. It was able to monitor volatile organics at ppb levels. The system exhibited good reproducibility, long-term stability and low detection limit. The system response was a function of flow rate, purge chamber volume and temperature. A predictive model was developed based on gas-liquid partitioning of the organics. This was found to describe the experimental data quite well and could be used to predict system performance.

To further improve the microtrap technology, a novel nanomaterial, namely carbon nanotube was used as the active film in the microtrap CNTs were self-assembled on the inside surface of stainless steel capillaries. The iron in the steel served as the catalyst for nanotube growth. The CNT film served as the surface for adsorption and desorption of organic molecules. The developed CNTs were mainly multiple wall type and no SWNT was observed. The CNT film was good for high adsorbtion as well as fast desorption of VOCs such as hexane and toluene. The sorption of toluene was much stronger than hexane, which is attributed to the pi-pi interaction between the CNT and the aromatic ring.

5.2 Recommendations and Future Works

The recommendations below were identified from experience during the research. These interesting points may encourage more research works to achieve a success in real-time monitoring of volatile organic compounds

1. For the development of on-line purge and trap for continuous monitoring of VOCs in water, the study should be expanded to other compounds especially compounds of different volatility and polarity.

2. For the development of a microtrap by deposition of CNT film on the wall of a steel capillary, the condition of self-assembled synthesis produced only the multiple wall CNT. Single wall CNT has more surface area than multiple wall which should show different characteristics. So it should be useful to conduct more study on the condition and carbon source which can produce single wall CNT with high breakthrough volume.