CHAPTER 4

CONCLUSION

Monitoring of chloride content in surface water around a pickling food factory was conducted in Hangdong district, Chiang Mai province once a month during the rainy season (August, September/2003) and dry season (December/2003, January/2004). Water samples were collected to measure physical and chemical parameters on field including: pH, temperature, conductivity, total dissolved solids, dissolved oxygen for supporting data of chloride results. Eight sampling sites were selected (see Figure 2.2). They were: supplied water pond as control site (site 1), 1st sediment pond (site 2), 2nd sediment pond (site 3), discharged place to small channel (site 4), junction place to big channel along the road (site 5), 50 m far from site 5 along the road (site 6), 100 m far from site 5 (site 7) and 200 m far from site 5 (site 8), respectively.

Determination of chloride content in water samples has been carried out by two methods: Sequential Injection Analysis using potentiometric detection and Argentometric method titration. The good agreement between two methods was achieved by confirmation of t-test ($P > 0.05$). The precision of SIA method was calculated by repeated measurement of 11 replications of 0.01, 0.02 and 0.04M of chloride solutions. %RSD was achieved of 0.7%, 0.9% and 1.3% for each above solution, respectively. The chloride results got from four sampling times were shown the variation among sites in Figure 3.7, which was reduced the concentration in site 5 and increased a little bit again in site 6 and 7, this attention also matched with the supporting data from conductivity and TDS. The reason of this problem comes from the less water movement along the stream, so that the water in more far sites contained a long-standing water with higher chloride concentration. It could be recognized clearly the difference between control site (site 1) with other sites due to the chloride contamination from the factory. It was

also confirmed by one-way ANOVA analysis and LSD test for comparison among sites. The correlation test has confirmed the relationship of chloride with conductivity, TDS and temperature at $P < 0.01$. It could be proved the seasonal variation among 4 sampling sites with highly significant difference ($P < 0.001$). The water in the channel might gradually absorb to the soil and finally to underground water, which will be more difficult to assess the adverse effect. Therefore, there should be an appropriate consideration on frequently monitoring the chloride content in surface water surrounding the pickling food factory, since then it will find out the suitable treatment method before discharging the wastewater to the surrounding area.

The SIA method has been used in this research to determine the chloride concentration as an alternative of the standard methods recommended by APHA. In comparison with recommended methods, SIA method has more advantages. Firstly, it is the *"reagentless procedure"* with using only 0.1ml of reagent per sample in contrast with a plenty of ml of reagent in other methods. Secondly, it is used *"replacement of hazardous reagents"*. The using reagent here is KNO_3, which is cheap and non-toxic in comparison with Ag^+ and Hg^{2+} reagents of other methods. Thirdly, it is also the *"procedures for waste minimization"* due to the less consumption of samples and reagents. Moreover, it is entirely automated by the computer, therefore it is easy to operate. The time for analysis is also reduced with the sampling rate of 60 throughputs.h^{-1}. Therefore, SIA is cost-effective method. All of the above advantages are followed the new approach of analytical chemistry, which is *"greener analytical chemistry"* (Rocha *et al.*, 2001) and friendly environmental trend.