CHAPTER IV

CONCLUSION

Sequential injection analysis with lab-on-valve (SIA-LOV) method for determination of acidity as citric acid content in fruit juice was developed. The proposed method is based on acid-base titration. The preliminary conditions obtained from calculation (Figure 3.2) were 40 µl of 0.12M NaOH, 20 µl of sample and 6 µl of 0.05%(w/v) indigo carimine indicator, respectively. These solutions and air were sequentially injected into a holding coil and well mixed to form a monosegment solution plug. The remained NaOH in mixed solution inversely proportional to concentration of acid. This excess sodium hydroxide defines a pH of a mixed solution which should be in the pH range where the color of indicator is changed. The change of indicator color intensity is directly proportional to the concentration of acid and can be detected by a spectrophotometer at 608.9 nm. The advantages of the method include simple, fast and low operational cost with the minimal amount of reagents consumption.

For the determination of acidity (as citric acid contents) in fruit juice, citric acid standard solutions in the range of 0.0-1.2%(w/v) were employed for making a calibration graph. Optimum conditions for 0.0-1.2%(w/v) of citric acid were 15 µl and 200 µl of air at the end and the beginning of the zone respectively, 6 µl of 0.05% (w/v) indigo carmine indicator, 40 µl of 0.12M sodium hydroxide and 20 µl of citric acid which prepared in 10%(w/v) sugar solution. Flow rate for aspiration was 8.33 µl

s^{-1} and dispensation to detector was 16.66 µl s^{-1}. Aspiration sequence was air, citric acid standard or sample, indigo carmine indicator, sodium hydroxide and air, respectively.

The proposed method was successfully applied to determine acidity of some fruit juice samples. Although sugar contents in real sample interfered the method, this problem could be solved by adding 10%(w/v) sucrose into the standard solutions. The proposed method is not suitable for some samples that have color similar to the color of indicator and some samples that other organic acids contain as major contents. Interferences from some coloring substances and other carboxylic acids should be investigated further.

The developed method showed good precision which RSD of 1.2% (for 0.6% (w/v) citric acid; n = 11). The results obtained from the SIA-LOV method agreed with those from titrimetric standard method as compared by the t-test at 95% confidence.

The proposed method is ideally suitable as a process analyzer for quality control in a production process as it is an automated system. It can be computerized controlled, therefore the change of many variables can be done without any physical reconfiguration of the flow manifold. In addition, the reagent consumption is much lower than those of standard method. The proposed method can be considered as a green technology because it deals with water based solution and therefore, chemical

waste can be reduced. The concept of using monosegment for increasing mixing without promoting dispersion can also be applied to any wet chemical analysis.