CHAPTER 4

CONCLUSIONS

Two groups of FI procedures were investigated for the determination of some metal ions (calcium, magnesium, iron and zinc) and ethanol. FI-colorimetric procedures for the determination of calcium, magnesium, iron and zinc employ Mg-EDTA and EBT reagents. It was based on the replacement of Mg(II) in Mg-EDTA complex by the metal ions. And then the released Mg(II) was reacted with EBT to form Mg-EBT complex, which its absorbance at 530 nm was proportional to the concentration of the metal ions. The same FI system can be used for determination of calcium or magnesium or iron or zinc, one at a time. The optimum conditions are summarized in Table 3.8. The linear calibration graphs were obtained for the concentration range from 2.0 – 6.0 mM (calcium, magnesium, and iron) and 2.0 – 5.0 mM (zinc). The detection limit of calcium, magnesium iron, and zinc were 0.6, 07, 0.4 and 0.5 mM, respectively. The method was successfully applied to determination of calcium, magnesium, iron, and zinc in drug and mineral supplement samples containing single sample. The precision of overall procedure for the determination of calcium, magnesium iron, and zinc in some samples were 2.1, 1.9, 2.4 and 1.5%, respectively. The sample throughput was approximately 200 injections per hour.

FI-voltammetry and on-line derivatization for the determination of ethanol was developed. The derivatized ethanol was determined by OSWV technique. The behaviors of chemical used such as TAHS, NaOH and CS_2 were investigated by batchwise procedure prior to apply for flow injection procedure. Firstly, it was found

that the phase transfer catalyst (TAHS) did not significantly affect the observed peak current. Secondly, the higher peak current was obtained when using higher NaOH concentration. Lastly, the amount of CS_2 had no effect to peak current.

A laboratory made flow cell for HMDE was designed and constructed. Testing of this flow cell was performed by determination of zinc. The linear calibration graphs were obtained for the concentration range from 0.1 – 4.0 ppm of zinc. A correlation coefficient (r^2 = 0.9985) and RSD values (2-5%, n=3) were obtained. Therefore, it can be concluded that the laboratory made flow cell can be used for voltammetric detection and using HMDE as a working electrode.

The gas diffusion unit was developed for on-line derivatization system. Flow rate of NaOH and CS_2 were directly affected not only to peak current but also to leakage of CS_2. So the similar flow rates were set on both sides of the membrane to control pressure. The same flow rate (2.0 mL/min) setup gave the best precision. Peak current obtained was proportional to xanthate concentration, which is proportional to the original ethanol concentration The linear calibration graphs were obtained for the concentration range from 10.0-40.0% v/v. A correlation coefficient and RSD values were 0.9840 and 5-33% (n=3), respectively. From the results, it can be concluded that this procedure can not be applied for determination of ethanol in real sample. Last of all, the suggestion of this system was described.

Two e-books describing the principles, the above procedure are presented in the appendices. One of the FI colorimetric procedures for the determination of the metal is in the Appendix A. The other on the electrochemical technique in the Appendix B.