CHAPTER 4

CONCLUSIONS

Sample pretreatment using in-valve and on-line columns by employing FI systems have been investigated.

4.1 FI-in-valve ion exchanger mini-column for preconcentration of cadmium, copper, lead and zinc determination coupled to FAAS

The proposed method describes a simple on-line preconcentration manifold with mini-column containing a Chelex-100 resin. The procedure offers several advantages over a manual operation. It is quite fast and simple, precise and sensitive. The developed method was successfully applied for determination of cadmium, copper, lead and zinc in tap, surface and wastewater samples.

4.2 FI-in-valve mini-column pretreatment combined with IC for cadmium, lead and zinc simultaneous determination

An in-valve column the FI system for sample pretreatment coupled to IC for simultaneous determination of some cations in zinc ore samples which have high amounts of matrix interference, has been successfully applied.

The on-line sample matrix interference removal is easily automated, and eliminates costly and time consuming off-line operations. The sample pretreatment can be performanced on-line to ion chromatography because the matrix components do not reach and damage IC column. The developed FI-IC method offers advantages over traditional analytical procedures. It proved to be comprehensive in its range of macro cations to be simultaneously analyzed, and is accurate, reliable and uses readily available chemicals.

4.3 On-line preconcentration and quantitation of benzene, toluene and *p*-xylene by using Raman liquid-core waveguide sensor

This work demonstrates that a Teflon-AF 2400 optical liquid core waveguide can be used to both preconcentrate analytes (benzene, toluene and *p*-xylene) and detect them to greatly improve the sensitivity of a Raman measurement of select aromatic compounds. The optical properties (lower refractive index than water) of Teflon-AF 2400 allow it to be used with aqueous solutions. A small volume of eluting solvent, 70% acetonitrile in water, was useful for extracting the analytes from the waveguide during the Raman detection mode. The excitation was carried out at 785 nm from the laser source. The Raman waveguide sensor can be used for preconcentration, characterization and analysis of mixtures of benzene, toluene and *p*-xylene. The sensor is likely to be broadly applicable for simple to moderately complex aqueous samples. The combination of separation and spectroscopy technologies is a novel approach for leveraging the strengths of both technologies.