

CHAPTER 4

CONCLUSION

The flow based anodic stripping voltammetry with bismuth film electrode system was developed for determination of cadmium and lead in water samples. In this work, an in-line preparation of in situ plated bismuth film on glassy carbon electrode was investigated for anodic stripping voltammetric determination of cadmium and lead. This electrode is more environmentally friendly than the commonly used mercury working electrode. Bismuth film electrode is conveniently used in flow system, thus improving analytical performance of metal analysis by voltammetry.

The conditions for operating the system efficiently have been optimized and the optimum conditions were obtained as summarized in Table 3.4 (page 47). The method is successfully applied for the determination of cadmium and lead in real water samples. The proposed method provides high sensitivity, cost-effective and convenient operation for the determination of cadmium and lead at trace level. The linear ranges were 2 – 40 $\mu\text{g/L}$ for both cadmium and lead. Relative standard deviations were 0.76-1.57% for 11-replicate injections of 5, 20 and 40 $\mu\text{g/L}$ of both Cd(II) and Pb(II). The method has percentage recoveries for the determination of those metals in range of 104.9 –115.3 for Cd(II) and 106.0 –119.5 for Pb(II). A sample throughput was 13 h^{-1} and detection limits were 0.89 and 0.59 $\mu\text{g/L}$ for Cd and Pb, respectively.

Suggestions for further study are given as follow: Although the developed method could be successfully applied for the analysis of water samples which are low

in interferences, the sample pretreatment procedure should be investigate to eliminate some organic compounds seriously interfere in voltammetric analysis.

Sample collection and storage are also important in the determination of trace metal ions. Glass container is usually avoided in order to reduce loss of the metal ions by adsorption and sample must be acidified and subjected to the analysis as soon as possible. The BiFE electrode is negligible toxic in respect to mercury, therefore it is suitable for use in routine determination of metal ions in various samples. With appropriate sample preparation, further analysis of soil and fertilizer, food and feed is also interesting.