

CHAPTER 7



CONCLUSION AND RECOMMENDATION

In the present study, the determination of thallium (I), indium (III), and gallium (III) by anodic stripping voltammetry were investigated on a glassy carbon electrode. The ASV of each species was studied in a variety of supporting electrolytes. In order to obtain the highest sensitivity in the analysis of each ion, the concentration of the supporting electrolyte, the pH of test solution and the electrodeposition time were tested. The technique used is for trace analysis, so the concentrations of the species in the range of 10^{-4} M and below are of interest.

By this technique, thallium can be determined in 0.1 M KNO_3 , 0.1 M KCl , and acetate buffer at pH 5.0. Owing to the ability of thallium to form stable complexes with chloride ion as TlCl_4^{3-} and TlCl_2^- , the ASV of Tl (I) in high concentration of KCl (higher than 0.1 M KCl) was avoided for the study. In either 0.1 M KNO_3 or acetate buffer at pH 5.0, the anodic stripping peak of thallium obtained is linearly dependent on the concentration of Tl (I) in the range of 1.00×10^{-5} to 1.00×10^{-4} M Tl (I) and 1.00×10^{-6} to 1.00×10^{-5} M Tl (I), using a deposition at -1.0 V for 3 and 10 minutes, respectively. The detection limits of Tl (I) in both supporting electrolytes are found to be 1.00×10^{-6} M Tl (I). Moreover, indium is successfully determined in the acetate buffer pH 5.0, and the linear dependence of the

anodic peak current to its concentration is obtained in the range of 1.00×10^{-5} to 1.00×10^{-4} M In (III) and 1.00×10^{-6} to 1.00×10^{-5} M In (III) with the deposition at -1.0 V for 3 and 10 minutes, respectively. The detection limit is of 1.00×10^{-6} M In (III). Since the anodic stripping peaks of both Tl (I) and In (III) occur in NaSCN supporting electrolyte, the ASV of Tl (I) and In (III) in NaSCN would be suggested for the further study.

Gallium is determined in 1.0 M NaSCN supporting electrolyte, and the anodic peak current is linearly dependent upon its concentration in the range of 1.00×10^{-5} to 1.00×10^{-4} M Ga (III) with a 5 minute electrodeposition at -1.7 V. In order to obtain the highest sensitivity, a longer deposition time (10 minutes) was attempted for the concentration of 1.00×10^{-5} M Ga (III) and below, but no anodic stripping peak of Ga (III) was produced. Therefore, the detection limit of Ga (III) by the anodic stripping analysis on the GCE in 1.0 M NaSCN is 1.00×10^{-5} M. Since a mercury-graphite electrode (123) and a hanging mercury drop electrode (124) have been reported for the anodic stripping voltammetry of Ga (III), the mercury plated GCE should be tried for the further study of the anodic stripping analysis of Ga (III).

The anodic stripping analysis of Tl (I) in the binary mixture of Tl (I) and In (III) is possible in 0.1 M KNO_3 at the concentration of Tl (I) in the mixture is higher than that of In (III). However, the anodic stripping analysis of Tl (I) in the binary mixture of Tl (I) and Ga (III) is very successful with no interference of Ga (III), even

Ga (III) is 10 fold excess. In addition, the anodic stripping analysis of each component in the binary mixture of Tl (I) and In (III) is appreciative in the acetate buffer pH 5.0 as the concentration of the component determined is at least twice of the other.

Finally, the determination of Tl (I) in the tertiary mixture of Tl (I), In (III), and Ga (III) by anodic stripping analysis in 0.1 M KNO_3 was reported with no interference from Ga (III). The anodic stripping analysis of this tertiary mixture in the acetate buffer pH 5.0 would be worth to study as well as the anodic stripping voltammetry of this tertiary mixture in NaSCN supporting electrolyte should be studied for the next project.