

Amperometric Trace Determination of Rh(III) and Os(VIII) with Thiodipropionic Acid

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Abstract

There are various techniques for estimation of Rh(III) and Os(VIII) metals, out of them amperometry is one of the economic technique. Many sulphur containing organic ligands have been used in amperometry for the trace determination of metal ions. Amperometric titration has also been used in past for trace determination of these metals with different ligands like Ethanethioic acid and 2-mercapto and 3-mercaptopropanoic acid. In the present study, amperometric determination of Rh(III) and Os(VIII) was carried out with Thiodipropionic acid (TDPA). TDPA has often been used as complexing agent and analytical reagent. This ligand has also been exploited earlier for the amperometric determination of manganese (Mn). The present work was undertaken with a view to extend the use of this ligand for the amperometric determination of Rh(III) and Os(VIII) in traces at d.m.e.. We have employed 0.1M NH₃ + 0.1M NH₄Cl medium for Rh(III) and 0.5M NaOH medium for Os(VIII). Cathodic as well as anodic titrations were carried out successfully for both metal ions. Metal species- TDPA stoichiometry obtained was 1:1 for both Rh(III) and Os(VIII) metal ions in both type of titrations. 5.15ppm for cathodic titrations and 10.29ppm for anodic titrations for Rh(III) and 5.71 for cathodic titrations and 9.51ppm for anodic for Os(VIII) metal ions were estimated with high degree of accuracy. Maximum error ($\pm 2\%$) was encountered in the case of most dilute solution. Study of interference of foreign ions were also studied Non-interfering species did not interfere even when present simultaneously in the cell solution. The study shows that thiodipropionic acid is suitable for the determination of trace quantities of Rh(III) and Os(VIII). The methods give reproducibility with standard deviation of 0.05 only. The techniques have the added advantages for the developing country like India in being relatively quick, economic and simple.