DETERMINATION OF LEAD BY CATHODIC ADSORPTIVE STRIPPING VOLTAMMETRIC METHODS IN THE PRESENCE OF RESORCINOL

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Lead is a poisonous metal that can damage nervous connections and cause blood and brain disorders. Lead poisoning typically results from ingestion of food or water contaminated with lead [1]. So, due to the toxicity of lead, selective signaling of lead is very important for the detection [2]. The commonly used method for lead analysis is atomic absorption spectrometry and atomic emission spectrometry. They have high selectivity; but, disadvantages of these methods are relatively time consuming and require highly specialized personnel as well as rather expensive instrumentation. Despite these methods, electrochemical stripping methods carried out by the deposition with the preconcentration of an analyte onto the working electrode surface are one of the most suitable methods for the determination of trace heavy metal ions. Moreover, they have the advantage of being relatively less expensive, highly sensitive and a low limit of detection. Therefore, electrochemical techniques are becoming more and more popular as alternative methods in trace element analysis [3-6].

In this study, differential pulse cathodic adsorptive stripping (DPCAdSV) and square wave cathodic adsorptive stripping (SWCAdSV) voltammetric methods were successfully developed for the determination of lead. The methods were based on the adsorption of the resorcinol complex of lead on the hanging mercury drop electrode. The potential was scanned to the negative direction and the differential pulse and square wave stripping voltammograms were recorded. The optimum experimental conditions (pH, deposition potential, ligand concentration, stirring rate and deposition time) and the analytical parameters from calibration graph (such as linear working ranges, detection limit) were determined. In the presence of resorcinol for the determination of lead, optimum pH, deposition potential, resorcinol concentration, stirring rate and deposition time were found as 4.0, -0.60 V, 3.0x10⁻³ M, 600 rpm and 60 s, respectively. Linear working ranges obtained from calibration graphs of lead by using DPCAdSV and SWCAdSV were 2.0x10⁻⁹ – 5.2x10⁻⁷ M and 2.0x10⁻⁹ – 5.3x10⁻⁷ M, respectively; limits of detection were found to be 3.6x10⁻⁹ M and 1.0x10⁻⁹. The procedure was applied to the determination of lead in tap water and the results are compared with those obtained by graphite furnace atomic absorption spectrometric method within a confidence limit of 95 %.

References