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DEVELOPMENT OF COST EFFECTIVE ELECTROANALYTICAL METHOD FOR DETECTION OF ALOIN

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Aloin (10-Glucopyranosyl-1, 8-dihydroxy-3-hydroxymethyl-9-anthracenone) naturally exists in the latex of Aloe-vera plant leaves as a mixture of two diastereomers, termed Aloin A (also called barbaloin) and Aloin B (or isobarbaloin). Aloin has been recognized as a stimulant-laxative, treating constipation by inducing bowel movements. In the recent past, various foodstuffs, beverages, medicines and cosmetics containing aloe-vera have been commercialized. The aloin content must be strictly regulated in aloe-based food commodities due to some undesirable effects of aloin. Therefore, the detection of aloin is important. Currently, several highly accurate but expensive methods based on chromatographic techniques such as high performance liquid chromatography and gas chromatography have been developed for aloin quantification. The objective of this research is to develop reliable and cost effective electroanalytical method for the quantification of aloin. Cyclic voltammetry (CV) was used for basic characterization and subsequently Amperometry was used as a quantitative tool. The entire electrochemical analyses were performed under the N_2 saturated environment and dark conditions were maintained. Glassy carbon (GC), saturated calomel (SCE) and platinum wire electrodes were used in the three electrode system as working electrode, reference electrode and counter electrode respectively. Commercial aloin recrystallized using water was used with 0.1 mol dm^{-3} phosphate buffer at the optimized pH of 7 as the background electrolyte. According to the cyclic voltammogram of aloin, an oxidation and a reduction peaks appeared at -490 mV and –675 mV vs. SCE electrode respectively. The cathodic peak was concentration dependent showing the ability for quantitative analysis of aloin using CV. Even though the amperometric determination of aloin on bare GC electrode was less precise due to the enhanced noise levels, stearic acid modified electrode surface could overcome the problem. The best amperometric responses were observed with GC electrode modified with 1% stearic acid at the optimized potential of -0.650 V vs. SCE. The electroanalytical sensitivity and minimum detection limit at a signal to noise ratio is 3 for CV and amperometric sensors were 6.11×10^{3} mol^{-1} dm^{3},1.06×10^{3} mol^{-1} dm^{3} and 0.216×10^{-3} mol dm^{-3}, 3.75×10^{-3} mol dm^{-3} respectively. Therefore, amount of aloin present in commercial samples as well as in the natural samples could be quantitatively determined by the developed method.