CHRONOPOTENTIOMETRIC STUDY OF NICOTINAMIDE (VITAMIN B_3)

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Abstract

The electrochemical behavior of nicotinamide, a vitamer of vitamin B_3, was studied employing adsorptive stripping chronopotentiometry. Mercury film electrode was used as the working electrode, whereas the Ag/AgCl (3.5 mol/l KCl) and a platinum wire were used as the reference and the auxiliary electrode, respectively. The most important experimental and instrumental parameters were optimized and proposed method was validated. Citrate buffer of pH 6 (0.05 mol/l) was used as the optimal supporting electrolyte. The analytical signal of vitamin B_3 was the highest and sharpest in quiescent solutions, leading to the conclusion that no stirring during the accumulation step was needed. The appropriate experimental conditions were as follows: accumulation potential of -1.405 V, accumulation time of 15 s in a quiescent solution and oxidation current in the range of 1.4 – 15.1 μA. The thickness of the mercury film was investigated and optimized as well, with the optimal value being 129.82 nm, which corresponded to the deposition time of 240 s from a 0.2 g/l Hg^{2+} ion solution. A well-defined oxidation wave belonging to nicotinamide appeared at about -250 mV. The linearity of the analytical signal was achieved in two concentration ranges: 5 – 25 mg/l and 10 – 100 mg/l. The calculated limit of detection (LOD) and limit of quantitation (LOQ) values were 2.20 mg/l and 6.66 mg/l, respectively. The precision of the developed method was acceptable (relative standard deviation (RSD) < 3.90%). Further study is in progress to apply proposed method to the determination of nicotinamide in pharmaceutical preparations.

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