A new electroanalytical method for determination of nitrites in water sample using surface response methodology

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A new selective electroanalytical method has been developed and optimized for the determination of nitrites in water samples. This electroanalytical method is based in a specific reaction of nitrites with ranitidine in 0.1 M Britton Robinson buffer (pH 2.0) to form an electroactive nitrosamine and 2-methylfuran cation. Electrochemical reduction of the 2-methyl-2H-furan-3-one with side chain derived from ranitidine at the unmodified screen-printed electrodes was observed at -0.413 V using square wave voltammetry. Working conditions (such as temperature, time, pH, concentration of the buffer and ranitidine) as well as electroanalytical parameters (frequency, step potential and amplitude) necessary for quantitative nitrites reaction and subsequent electrochemical detection using square wave voltammetry had to be optimized using surface response methodology. Two linear ranges from 2.0×10^{-6} to 5.0×10^{-4} mol L^{-1} and from 5.0×10^{-4} mol L^{-1} to 1.0×10^{-3} mol L^{-1} of nitrites characterized by correlation coefficients 0.9996 and 0.9975, limits of quantification 3.2×10^{-6} mol L^{-1} and detection limit of 6.9×10^{-7} mol L^{-1} were achieved. The recovery results for different concentration have shown that SWV is sensitive method for determination of nitrite ions in water and wastewater samples being comparable to spectrophotometric method.

Keywords: nitrite ions; ranitidine; screen-printed electrode; square wave voltammetry.