INDIRECT CLOUD POINT EXTRACTION AND SPECTROPHOTOMETRIC DETERMINATION OF TRACE NITRITE DIFFERENT BEVERAGE SAMPLES

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Nitrite is a versatile chemical agent which has found numerous applications ranging from dye manufacture to food preservation. It produces carcinogenic nitrosamines in the human body through its reaction with amines or amides \(^1\). Nitrite is one of the pollutants found in the atmosphere and natural water \(^2\) and is an important intermediate in biological nitrogen cycle. Trace amounts of nitrite and nitrate in aqueous beverage and foods as well as drinking water may lead to methemoglobinemia in infants and with long term exposure is a possible cancer risk. Therefore, there is a great need to develop a simple, sensitive, selective and inexpensive method for the determination and continuous monitoring of trace amounts of nitrite in food and beverage samples.

A new indirect micellar mediated cloud point extraction method has been developed for sensitive determination of trace amounts of nitrite by means of spectrophotometry. The method is based on complexation of triiodide ion, \(I^3_-\) produced by the reaction of nitrite with excess iodide with Coomassie brilliant blue R 250 (CBB\(^+\)) in \(H_2SO_4\) medium, and then the CPE of ion-pairing complex formed from aqueous solution at \(CH_3COONa\) medium using Triton X-114. The extracted surfactant rich phase is diluted with THF and its absorbance is measured at 589 nm. The effects of analytical variables such as concentration of nonionic surfactant, \(KI\) and CBB\(^+\) concentration, incubation temperature and time, centrifugation rate and time, \(H_2SO_4\) and \(CH_3COONa\) concentrations on the CPE were studied in details and a set of optimum conditions was obtained. The calibration graphs were highly linear in the range of 0.5–5 (with 0.5 mL of \(1.0x10^{-4}\) mol L\(^-1\) CBB\(^+\)) and 5-200 µg L\(^-1\) (with 0.7 mL of \(1.0x10^{-4}\) mol L\(^-1\) CBB\(^+\)) in absence and presence of bromide with changing sensitivity. The limits of detection and quantification (LOD and LOQ with a coefficient of variation (CV) of 6.93%) based on ratio of three and ten times the standard deviation of the ten replicate blank measurements to slope of calibration curve (3\(σ_{\text{blank}}/m\) and 10\(σ_{\text{blank}}/m\)) was 0.15 and 0.49 µg L\(^-1\) (n: 10) and the precision (as RSD) for determination of 5, 25 and 75 µg L\(^-1\) of nitrite was in range of 2.10-5.35% (n: 6). The method was successfully applied to the determination of nitrite, nitrate and total nitrite in different beverage samples.

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