



Quantitative analysis of some inorganic anions (nitrate and nitrite) in metropolitan and bottled water samples using ultra-performance liquid chromatography/electrospray ionization mass spectrometry

Ibrahim Hotan Alsohaimi^{a,*}, Mohammad Rizwan Khan^b, Zeid Abdullah Allothman^b, Saikh Mohammad Wabaidur^b, Masoom Raza Siddiqui^b, Nasser Fahad Alotaibi^a, Ayman Abdul Ghfar^b

^aChemistry Department, College of Science, Jouf University, Sakaka, Saudi Arabia, Tel. +966 504904183, email: chem-ihg@hotmail.com (I.H. Alsohaimi), ta.weel@hotmail.com (N.F. Alotaibi)

^bDepartment of Chemistry, College of Science, King Saud University, P.O. Box 2455, Riyadh 11451, Saudi Arabia, email: mrkhan@ksu.edu.sa (M.R. Khan), zaothman@ksu.edu.sa (Z.A. Allothman), tarabai22@gmail.com (S.M. Wabaidur), siddiqui124@gmail.com (M.R. Siddiqui), aymanghfar@gmail.com (A.A. Ghfar)

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ABSTRACT

N-Nitroso compounds have been recognized as potent carcinogens and are produced endogenously from drinking water and nutritional supply of nitrate and nitrite. Thus, the screening of nitrate and nitrite has become essential to certify the quality and protection of drinking water. In the present study, a new, rapid and precise technique based on ultra-performance liquid chromatography/electrospray ionization mass spectrometry (UPLC-ESI/MS) has been optimized for the analysis of nitrate and nitrite in drinking water. The nitrate and nitrite were separated using reversed-phase Acquity UPLCTM BEH C₁₈ (50 mm × 2.1 mm i.d., 1.7 µm particle size) analytical column at optimum isocratic mobile phase compositions (water/methanol, 25/75, v/v). The established technique was linear ($R^2 > 0.999$) over the working concentration values from 0.010 to 10 mg L⁻¹, the run-to-run and day-to-day precisions were <4% ($n = 5$) in terms of relative standard deviation (RSD, %), when examining a nitrate and nitrite standard mixture of concentration 0.05 mg L⁻¹. Nitrate and nitrite detection limits were found to be 0.03 µg L⁻¹ and 0.04 µg L⁻¹, respectively. The proposed UPLC-ESI/MS technique has been employed effectively for determination of nitrate and nitrite in metropolitan and bottled water samples that have already used in Saudi Arabia. Ten metropolitan and twenty bottled water samples have been examined and result was found in the range of 0.35–9.02 mg L⁻¹ for both anions. The recovery rates of nitrate and nitrite were higher than 99% in all of the analyzed water samples.

Keywords: Nitrate; Nitrite; Metropolitan water; Bottled water; Ultra-performance liquid chromatography/electrospray ionization mass spectrometry

*Corresponding author.