Method Validation for Quantification of Selected Non-Nutritional Sweeteners and Preservatives and Caffeine in Carbonated Beverages Commercially Available in Sri Lanka

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A study was carried out on validating a method for quantification of selected non-nutritional sweeteners and preservatives and caffeine in carbonated beverages commercially available in Sri Lanka. A liquid chromatography method with photodiode array detection was developed with SHIMADZU Shim Pack HR ODS column with particles of 3.0*150mm and potassium dihydrogen orthophosphate (pH 4.3) and acetonitrile as mobile phases in 88:12 ratio. Validation was performed in terms of linearity, specificity, reproducibility, recovery, Limit of Detection (LOD), and Limit of Quantification (LOQ) values. Detection was done by photodiode array detector and wavelengths used were 200 nm, 214 nm, 230 nm, 235 nm, 258 nm and 275 nm. Aspartame, acesulfame-K, sodium saccharin were selected as non-nutritional sweeteners, and benzoic acid, sorbic acid were selected as preservatives. Aspartame, acesulfame-K, sodium saccharin, benzoic acid, sorbic acid, and caffeine showed linearity within the 1-100 ppm range. The correlation coefficient (R^2) for all the compounds tested was higher than 0.996. Recovery of all the compounds ranged between 70% and 120%. The LOD values ranged between 0.054 and 0.097 while LOQ values ranged between 0.18 and 0.32. The percentage relative standard deviations were ≤ 5 for all the compounds. The extraction process was optimized using the surface response methodology and box Behnken design. Process optimization was carried out by Design-Expert Software Version 12.0. The optimum extraction conditions were found to be ultrasonic temperature 25 °C, time 10 minutes and mobile phase concentration 50% (V/V). Good separation and quantification could be obtained within 15 minutes of total run time.

Keywords: Aspartame, Acesulfame-K and Sodium saccharin, Benzoic acid and Sorbic acid, Caffeine, Carbonated beverages

Government Analyst's Department is gratefully acknowledged for providing laboratory facilities.