

ANALYTICAL METHODS TO DETERMINE NON-NUTRITIVE SWEETENERS IN FOODS: A SYSTEMATIC REVIEW

ABSTRACT

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Sweeteners have been used in food for ages to increase both taste and appearance. However, the consumption of sweeteners, mainly sugars, has some adverse effects on human health when consumed in excessive doses for a certain period, including alteration in gut microbiota, obesity, and diabetes. Therefore, the application of non-nutritive sweeteners in foodstuffs has risen dramatically in the last decade to substitute sugars. These sweeteners are commonly recognized as high-intensity sweeteners because, in a lower amount, they could achieve the same sweetness of sugar. Regulatory authorities and supervisory agencies around the globe have established the maximum amount of these high-intensity sweeteners used in food products. While the regulation is getting tighter in the market to ensure food safety, reliable analytical methods are required to assist the surveillance in monitoring the use of high-intensity sweeteners. A systematic literature review was conducted to present the available analytical methods for the identification and quantification of sweeteners in foodstuffs. It is also necessary to comprehend the most appropriate method for rapid and effective analyses applied for quality control in food industries, surveillance and monitoring in the market, and so forth. Apart from various analytical methods discussed here, extraction techniques as an essential step of sample preparation are also highlighted. The proper procedure, efficiency, and the use of solvents are discussed in this review to assist in selecting a suitable extraction method for a food matrix. Single and multianalyte analyses of sweeteners are also described employing various regular and advanced techniques. Furthermore, to support on-site surveillance of sweeteners' usage in food products in the market, non-destructive analytical methods that provide practical, fast, and relatively low-cost analysis are widely implemented. The results show that, HPLC is a reliable separation method in the simultaneous analysis of multiple analytes. There are several alternative methods such as UHPLC, CE, FTIR, FT-Raman, FIA, and biosensors which provide faster analysis and can be used as routine analysis methods.

Keywords: non-nutritive sugar; rapid analysis; extraction; food control; high-intensity sweeteners