ABSTRACT

The variety and complexity of the chemical compounds in which minerals occur in foods makes it extremely difficult to find analytical methods to analyse food products. The most commonly used techniques for sample preparation are dry mineralization and wet mineralization.

Flame atomic absorption spectrometry (FAAS) is a method commonly used for the detection and quantification of minerals found in food products. Analytical problems associated with the determination of calcium, magnesium, potassium and sodium by this method are known and described in the literature. The FAAS technique is characterized by the occurrence of a number of undesirable interactions caused by the presence of anions formed during sample solution preparation and the presence of cations in the analysed medium or associated with solution ionization.

In the present study an attempt was made to establish the effect of applied mineralization conditions on the results of analyses carried out using the FAAS method, which involved determination of the content of selected mineral components in real food samples belonging to various food product groups, determination of the basic validation parameters of the method, determination of the effect of the physical state of food samples, their complexity, size and degree of homogeneity of the weighing specimens. This study also presents the current state of knowledge on the methods of preparation of food samples for analysis and determination of their calcium, magnesium, potassium and sodium content using FASS.

The results presented in this study allowed to establish the influence of the applied mineralization method on the assay results and the values of the basic validation parameters of the method.

The uncertainty of the test results was primarily influenced by the coefficient of calibration variation and the coefficient of recovery variation determined from assays of real samples and samples fortified with the addition of standard solutions of the elements being determined.

The analysis of the validation parameters of the method allowed us to compare both techniques of sample preparation and to conclude that the method of mineralization of real and fortified food samples had little influence on the content of calcium, magnesium, potassium and sodium determined by the (FAAS) method, while the preparation of samples for analysis by the dry ashing technique may generate more analytical errors due to a more complex procedure. Microwave mineralization, on the other hand, has a much less complex procedure, allowing samples to be prepared for analysis much faster.

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Dorota Bajek