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What Are the Problems in the Case of Analysis of Selenium by Inductively Coupled Plasma Mass Spectrometry in Food and Food Raw Materials?

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Abstract : For analysis of elements in different food, feed and food raw material samples generally a flame atomic absorption spectrometer (FAAS), a graphite furnace atomic absorption spectrometer (GF-AAS), an inductively coupled plasma optical emission spectrometer (ICP-OES) and an inductively coupled plasma mass spectrometer (ICP-MS) are applied. All the analytical instruments have different physical and chemical interfering effects analysing food and food raw material samples. The smaller the concentration of an analyte and the larger the concentration of the matrix the larger the interfering effects. Nowadays, it is very important to analyse growingly smaller concentrations of elements. From the above analytical instruments generally the inductively coupled plasma mass spectrometer is capable of analysing the smallest concentration of elements. The applied ICP-MS instrument has Collision Cell Technology (CCT) also. Using CCT mode certain elements have better detection limits with 1-3 magnitudes comparing to a normal ICP-MS analytical method. The CCT mode has better detection limits mainly for analysis of selenium (arsenic, germanium, vanadium, and chromium). To elaborate an analytical method for selenium with an inductively coupled plasma mass spectrometer the most important interfering effects (problems) were evaluated: 1) isobaric elemental, 2) isobaric molecular, and 3) physical interferences. Analysing food and food raw material samples an other (new) interfering effect emerged in ICP-MS, namely the effect of various matrixes having different evaporation and nebulization effectiveness, moreover having different quantity of carbon content of food, feed and food raw material samples. In our research work the effect of different water-soluble compounds furthermore the effect of various quantity of carbon content (as sample matrix) were examined on changes of intensity of selenium. So finally we could find “opportunities” to decrease the error of selenium analysis. To analyse selenium in food, feed and food raw material samples, the most appropriate inductively coupled plasma mass spectrometer is a quadrupole instrument applying a collision cell technique (CCT). The extent of interfering effect of carbon content depends on the type of compounds. The carbon content significantly affects the measured concentration (intensities) of Se, which can be corrected using internal standard (arsenic or tellurium).

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