Abstract

The main aim of this bachelor thesis was a determination of the elements K, Mg, Ca, Na, Zn and Fe in the potato tubers and in their boiled solution using the method of flame atomic absorption spectrometry. The chosen samples were late consumer potato tubers of Granada cultivar (boiling type B).

It was necessary to optimize working conditions before the sample analysis. The optimal flow rate of acetylene ranged from 2.0 to 2.5 l/min using the flame acetylene-air. The flame acetylene-nitrous oxide was used only for calcium with flow rate 6.0 l/min. The optimal height of a beam above the burner edge was measured in interval 5 to 7 pieces of defined scale mentioned in a manual for spectrometer GBC 933 AA. Using the optimal conditions, the basic characteristics for individual methods of determination were characterized (LOD, LOQ, LDR, sensitivity, repeatability). Limits of quantification were following: 78, 31, 7.0, 8.0, 190 and 71 μg/l for K, Na, Mg, Ca, Fe and Zn, respectively.

The optimal conditions were used for the determination of the selected elements in samples. The solutions were prepared from diversely processed potato tubers (whole, whole without skin, chopped without skin, skin) by boiling into deionized water. After the samples had cooled down, the concentrated nitric acid was added (turning into 0.24 % solution). The final concentrations (mg/g or μg/g) corresponds to the elements amount which came from potato tubers of specific mass into solution after 20 minutes of boiling.

To determinate the total content of elements in tubers, the samples of the tuber flesh and skin were decompose under the high pressure in the presence of nitric acid using microwave digestion process. The concentrations of elements in the final solutions were evaluated in mg/g (potassium) and in μg/g for other elements. The results were compared with the table values of their total contents in potato tubers and other vegetables (in units of mg/100g or μg/100g). The values were converted into representing percentages of recommended daily dose of the element for an adult.

The iron could not be determined in any prepared samples due to its LOQ lowest detectable values.

Key words

Atomic absorption spectrometry, flame atomization, potato tubers, microwave decomposition, potassium, sodium, magnesium, calcium, zinc, iron