

The microelements analyses in canned vegetables mix

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Abstract

The paper proposes microelements analyses in canned vegetables mix: Mn, Co, Fe, Cu, Ni, Se. The metals concentrations have been determined by AA spectrometry. The AA spectroscopy is carried out on a novAA 400 G atomic absorption spectrometer, with graphite oven, with WinAAS 3.17 software for evaluation, control and result presentation, a so-called cookbook, for every element, and a HS 55-1 hydride generator.

Keywords: vegetables mix, heavy metals, AA spectroscopy, total organic carbon

1. Introduction

The vegetables mix is a preserved product by using different techniques that modify their chemical composition and their quality. Concentrating the products has some advantages like reducing the product quantity which will be stored, manipulated, transported and preserved; the water activity must be max. 0,7 in order to inhibit the growth of undesired microorganisms (ORDIN 1050, 2006).

2. Materials and method

Samples preparation. The samples undergo an acidic digestion with high purity, metal free 65% HNO₃ using the MWS-2 Berghof mineralization and digestion system. A three-step program: T₁=160°C, t₁=15 min., P₁=40-60% from total power, T₂=210°C, t₂=15 min., P₂=60-80%, T₃=210°C → 100°C, t₃=15 min., P₃=0%. Thus resulted solutions have been completed with ultrapure water (RO System Operating

Barnstead apparatus) to equal volumes in 25 ml calibrated flasks.

Methods of analysis. The AA spectroscopy is carried out on a novAA 400 G atomic absorption spectrometer - Analytik Jena-Germany, with graphite furnace, WinAAS 3.17 software for evaluation, control and result presentation, a so-called Cookbook, for every element, and a HS 55-1 hydride generator. A TOC-V_{CPN} - Shimadzu - Japan equipped with Solid Sample Module SSM-5000 A, autosampler ASI-V and total nitrogen measuring unit has been used for inorganic (IC) and total organic carbon (TOC) analyses. Directly samples from the canes (unmodified) have been used. Calibration curves for TOC (using standard glucose p.a.) and IC (using standard NaHCO₃ p.a.) have been made.

3. Results and Discussions

Vegetables mix contain some microelements beneficial for human body: Mn, Co, Fe, Cu, Ni, Se.

Five types of vegetables mix have been studied, both local and imported: four of them packaged in metallic cans and one in glass bottle, for reference (**HOTARARE nr. 1197, 2002**). Microelements

concentrations have been determined by AA spectrometry (International Standard ISO 15586:2003). The results are presented in Table 1.

Table 1. Microelements concentrations in vegetables mix

No.	Sample	Concentration, ppm					
		Mn	Co	Fe	Cu	Ni	Se
1.	Vegetables mix <i>Sultan</i> (Romanian product, Turkish licence, metallic can)	0.2	**	34.42	**	0.02	**
2.	Vegetables mix <i>Conserv frig</i> (Romanian product, metallic can)*	0.21	0.09	35.64	**	**	**
3.	Vegetable mixt <i>Mib</i> (Romanian product, metallic can)	0.24	0.03	23,9	**	**	**
4.	Vegetable mix <i>Maxim's</i> , (Italian product, metallic can)*	13,02	0.001	79.10	**	0.45	**
5.	Vegetable mix <i>Buftea</i> (Romanian product, plastic can)	0.19	0.02	50.8	0.75	0.20	**

* before the samples were taken, the vegetables mix was homogenized at 1500 rpm with an IKA-LABORTECHNIK stirrer, with adjustable rotations and display unit observation

** under limit detection

The distribution of microelements in studied types of products were presented

more suggestive in Fig.1. The Mn, Fe and Ni contents are higher in vegetables mix *Maxim's*.

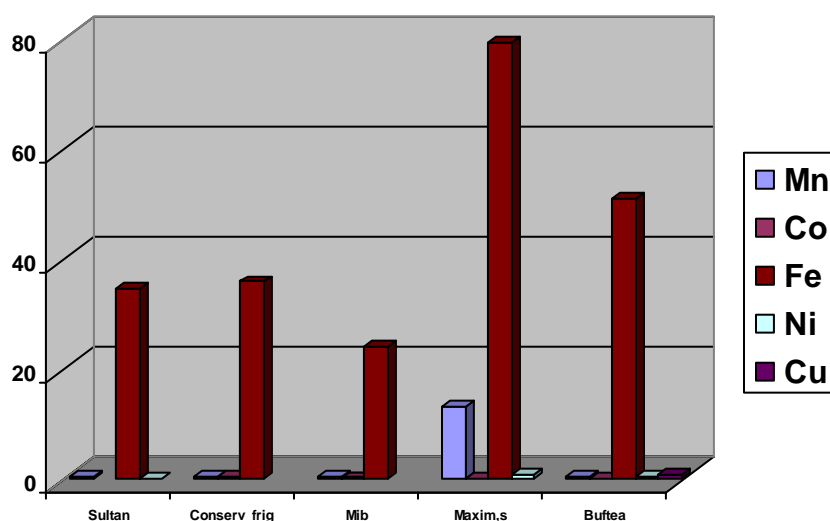


Fig. 1. Concentrations of microelements

For every food, fresh or canned, the sensorial analyses are very important. The texture characteristics in sensorial analyses are apprehended by taste.

The chemical methods used to characterize studied products are the determination of total inorganic (IC) and organic carbon (TOC): Table 2., Fig.2., Fig.3., and the total dry weight determination (Table 3).

Table 2. Total carbon, inorganic carbon and total organic carbon determinations

No.	Sample	Weight, mg	TC, %	Weight, mg	IC, %	TOC, %
1.	Vegetables mix <i>Sultan</i> (Romanian product, Turkish licence, metallic can)	264,5	10.05	270.0	-	10.05
2.	Vegetables mix <i>Conserv Frig</i> (Romanian product, metallic can)*	470.1	3.45	320.9	0.1	3.55
3.	Vegetables mix <i>Mib</i> (Romanian product, metallic can)	290.5	10.45	281.5	-	10.45
4.	Vegetables mix <i>Maxim's</i> , (Italian product, metallic can)*	445.1	2.49	190.7	0.06	2.55
5.	Vegetables mix <i>Buftea</i> (Romanian product, plastic can)	273.9	9.6	300.5	0.04	9.64

* before the samples were taken, the vegetables mix was homogenized at 1500 rpm with an IKA-LABORTECHNIK stirrer, with adjustable rotations and display unit observation

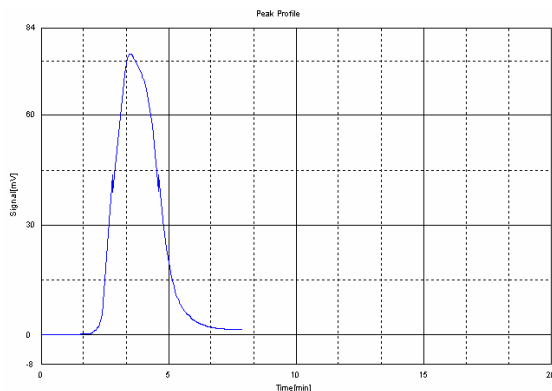


Fig.2. Total carbon determination in Vegetables mix *Conserv frig*

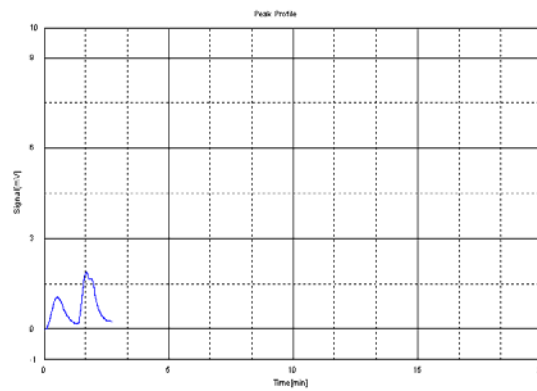


Fig.3. Inorganic carbon determination in Vegetables mix *Conserv frig*

TOC offered information about sum of organic compounds in vegetables mix: starch, proteins, sugars, fibers, vitamins, etc. IC offered information about sum

(presence) of carbonates and bicarbonates in samples.

The total dry weight has been effectuated by samples heating to 140-145°C until constant weight were obtained (Table 3).

Table 3. Total dry weight (T.D.W.)

No.	Sample	Weight, g	% T. D.W.
1.	Vegetables mix <i>Sultan</i> (Romanian product, Turkish licence, metallic can)	7.835	29.67
2.	Vegetables mix <i>Conserv frig</i> (Romanian product, metallic can)*	13.5057	7.87
3.	Vegetables mix Mib (Romanian product, metallic can)	9.2469	24.95
4.	Vegetables mix <i>Maxim 's</i> , (Italian product, metallic can)*	12.5128	22.83
5.	Vegetables mix <i>Buftea</i> (Romanian product, glass bottle)	9.6257	25.07

* before the samples were taken, the vegetables mix was homogenized at 1500 rpm with an IKA-LABORTECHNIK stirrer, with adjustable rotations and display unit observation

4. Conclusions

Vegetables mix and related products are always present in both oriental and European kitchen. The taste of these products can be different either because commune added ingredients such as salt, sugar, starch or others specific to some regions: chilly, spices, parsley, etc. The dry weight, TOC and IC values depend on technology used, but the microelements content in these products depend on soil, underground waters, vegetables type and capacity to extraction from soil and to retain different metals. Vegetables mix and similar products have also a high nutritive value due to the content of easily retainable sugars, vitamin C, carotenoids and mineral salts, being suitable for consumption in the winter season.

References

- HOTARARE nr. 1197 /24 octombrie 2002** pentru aprobarea Normelor privind materialele si obiectele care vin in contact cu alimentele (*Romanian specific standard*).
- ***International Standard ISO 15586:2003 (E), Water quality – Determination of trace elements using atomic absorption spectrometry with graphite furnace.
- ORDIN 1050 /21.12.2006** privind aprobarea Normei sanitare veterinare si pentru siguranta alimentelor privind anumiti contaminanti din alimentele de origine animala si nonanimala (*Romanian specific standard*).
- Wikipedia**, the free Encyclopaedia.