IDENTIFICATION THROUGH HPLC OF SYNTHETIC ADDITIVES WITH CARCINOGENIC EFFECTS FOUND IN CHEWING GUM

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Abstract

The effects of food additives on consumers' health are still insufficiently known, especially when it comes to their long term influence (mutagenic effects). By using physicochemical methods of analysis we may come to know them in every aspect possible and we can also identify them in various food products. That is why an emphasis was placed on two chemical compounds: acesulfame K (E-950) and aspartame (E-951) and on identifying them by using high performance liquid chromatography (HPLC).

Key words: food additive, acesulfame, aspartame, HPLC.

INTRODUCTION

Lately, more and more clinics and fundamental research laboratories report on an almost daily basis about the negative effects of food pollution. It has been proven that synthetic additives (better known under the generic name "E") are harmful, even carcinogenic, even though the law allows for their use. In other words, we are dealing with a legalized pollution of food (Bianu C. et. al., 2000). The impact of "Es" on the human body is enormous, as it does not recognize nor accept them and therefore it rebels.

The prolonged consumption of food containing synthetic additives causes the destruction of a human being's immune system (which begins to produce too many antibodies, using them against its own self), as well as a series of malignant or benign tumors (Dalmeyda V. Et. al., 1999) .

In Romania, the incidence of cancer is rising alarmingly and it is estimated that this condition will soon become "the disease of the 3rd millennium", as the premises of finding a cure do not exist yet. It is assumed though that the main causes for it are pollution, chemicals found in food and stress.

Chewing gum, a product mainly intended for children, contains no less than 9-10 types of chemical substances, many of which can be found on the list of suspicious or noxious substances.

The conducted studies were aimed at identifying the acesulfame-K E950 and aspartame E951 sweeteners by using HPLC and UV/VIS spectrophotometry (Rosset R. et. al., 1991).

MATERIAL AND METHOD

Aspartame (E-951) was discovered in 1965 by Jim Schlatter and, 20 years later, in 1985, the product was homologated and put on the list of food additives. The identification of E-950 and E-951 was performed by using a Jasco high performance liquid chromatograph (Japan), equipped with an UV/VIS detector (190-400 nm), while the data was processed using the Bormix soft. The stationary phase was a Nucleozi column 100

C18, 100x4.6 mm, MeOH: 1% acetic acid solution. For dosing the sweeteners in the water solution, the diagram of sampling peak area depending on concentration is built.

RESULTS AND DISCUSSIONS

Aspartame is a sweetener that can kill in 70 different ways; it can cause allergic reactions, migraines, lightheadedness, amnesia, hyperactivity, vision disturbances, multiple sclerosis, and even cancer (especially brain tumors). Aspartame contains phenylalanine, which has its implications regarding phenylketonuria.

The identification of aspartame (E-951) was performed by using HPLC, coupled with the UV/VIS spectrophotometer, while the readings were done at 230 nm. Various solutions were prepared and the results are presented in table 1.

Table 1.

Peak area for four E-951 solutions of various concentrations

Nr.	C%	RT	Surface units
1	0.02	4.224	1183984
2	0.015	4.676	58154
3	0.01	4.213	588992
4	0.003	4.419	305508

What was verified by the graph concerning the dependence between concentration and peak area of Acesulfame K (E-951) was a correlation of 0.99880, the graph being a line, as in fig. 1; the limit of quantification is 0.035%, while the limit of detection is 0.050%.

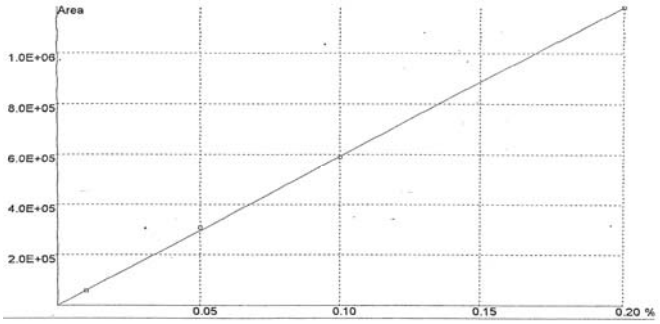

Fig.1. Sample curve of E-951 for HPLC

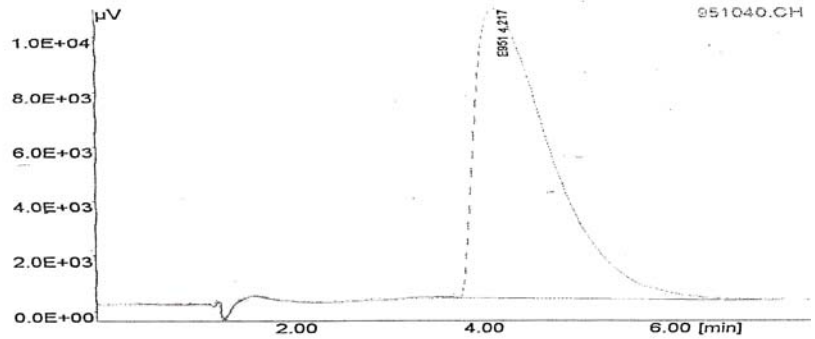

Fig.2. Chromatogram of 0.1% solution

The results regarding the identification of acesulfame K by HPLC in solutions with concentrations of 0.0015%, 0.003%, 0.01% and 0.02% are presented in table 2.

Table 2.

Peak area for four E-950 solutions of various concentrations

No.	C%	RT	Surface units
1	0.02	2.636	16992464
2	0.015	0.635	1256476
3	0.01	2.638	8751127
4	0.003	2.636	2495789

Linearity was checked in the studied concentration interval, resulting in a correlation of 0.99983, the graph being a line J=Ax, where A=854487513.94. The chromatogram are presented in figures 3, while the sample curve of E-950 for HPLC is shown in fig. 4.

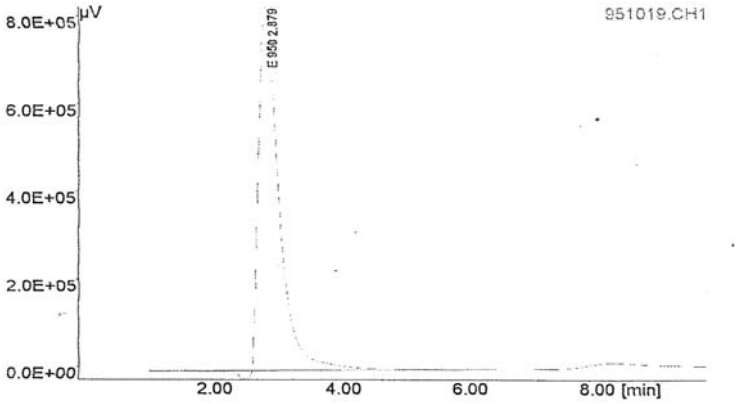

Fig.3. Chromatogram of 0.02% solution

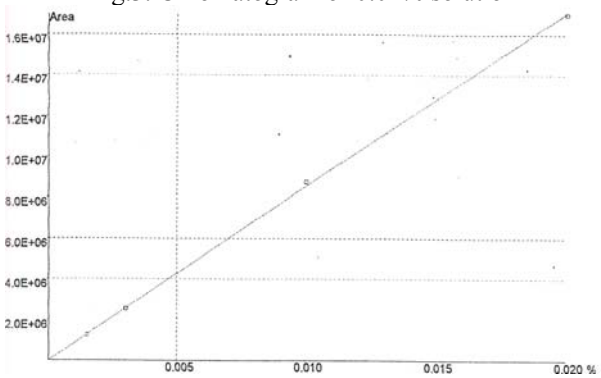

Fig.4. Sample curve E950 for HPLC

The limit of detection for E-950 is 2mg/L, whereas for E-951 it is 10 mg/L. The total absolute error is always below the limit of detection.The sample diagram can be used for determining the concentrations of E-950 water solutions, within the concentration limits of 10-40 mg/L, respectively 20-100 mg/L for E-951, because in this domain, the value of absolute absorbance vary linearly with concentration.

CONCLUSIONS

- High performance liquid chromatography (HPLC) can be successfully used for identifying synthetic additives that have a harmful effect on the human body.
- The limits of detection allow us to evaluate the content of Es found in food products, so that the proper authorities may implement the most adequate and rapid means of prevention.
- The limit of quantification and detection is in agreement with FRX.

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