

## THE INCREASE STABILITY OF SUGARY BISCUITS AND OF FRIED FOODS USING ANTIOXIDANTS

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### Abstract

*The papers refers about the antioxidant action of beta -carotene in producing sugary biscuits, of Rosemary extract and Tenox VI (mixture of BHA, BHT, propyl galate and citric acid) for fry potato chips in different oils; the purpose it was to prevent the oxidation of lipid components in order to maintain the sensorial qualities and the physical-chemical properties during the validity period.*

*In this purpose we have realised the following tests:*

*- two tests of sugary biscuits: a sample control and a sample with pharmaceutical beta-carotene, of vegetal origin;  
-six tests for fried patato: three tests with fried potato in sun flower oil and three tests with fried potato in mixture(1:1) of sun flower oil-corn oil*

*The samples were analysed periodically during the validity period (6 months) for biscuits and seven days for potato chips.*

*It was determined as a chemical indicator the peroxide value of the fat extracted from the samples and the efficiency of the antioxidants used.*

*Studying the results obtained we can underline the beneficial effect of using the natural antioxidants for stabilizing in time the physical-chemical properties of products and improving their sensorial qualities: beta-carotene for the sugary biscuits and Rosemary extract for potato chips.*

Keywords: antioxidant, beta carotene, Rosemary extract, Tenox VI, peroxide value

### INTRODUCTION

During storage, the sugary biscuits and potato chips are susceptible of demotion by decreasing the sensorial qualities and even by alteration (mouldiness, enzymatic demotion).

The sugary biscuits and potato chips, because of their high level of lipid components (12-20%) can suffer an oxidation at an inadequate storage. For a good storage it is recommended that the temperature is 18-20°C and the humidity of air to be maximum 70%.

The conservation of this products from the point of view of the stability of lipid components is more complex than the conservation of fat, because there are other factors that clung by the nature and by the composition of the oxidate substratum, humidity, wrapper nature and display manner.

The extension of kipping length redount to the demotion of quality products.

For encreasing the stabillity of lipid components there are used antioxidats.

The antioxidants are substances that increase the foodstuff kipping length by protecting them from oxidation.

When choosing an antioxidant we must consider:

- antioxidant solubility and dispersal in lipid components
- ulterior modification of organoleptyc properties
- substratum pH
- the process temperature

Considering all this factors, we choose to use the beta- carotene, Rosemary extract and Tenox VI as antioxidants.

To prevent cancer it is recommended the daily use of 6 mg B-carotene,concording with 100g of carottes, 1200g tomatoes, 6000g aples.

The consumption of B-carotene doesn't envolve any risc.

B-carotene protective service in human organism,operate in three ways:

- it annihilates the free radicals which are inside the organism; free radicals are

extremely aggressive molecules which contain one or more impair electrons (with negative characteristics) and which from this reasons come in contact with other molecules, in this way being capable to degenerate the cells, to contribute to their multiplying (inducing cancer);

the carotens can absorb the high energy of the free radicals, themselves transforming into free radicals less reactivs, and free their energy surplus by heat.

- increase their own capacity to protect the organism by putting "in movement" the fagocytes which annihilate the cancer producing cells which are forming within the organism.

- it connects the so-called singlet oxygen ( ${}^1O^2$ ).

The presence of antioxidants in spices, specifically Rosemary is well known. However, the extracts of such spices usually have a strong odour and bitter taste and therefore cannot be used in most food products.

At present, addition of synthetic antioxidant such as Butylated Hydroxytoluene (BHT) and Butylated Hydroxyanisole (BHA) are the most popular way to delay oxidation in foods.

Use of such compounds has been increased greatly for improving the stability of lipids. However, application of synthetic antioxidants is questioned as a results of vast evidences that show toxicity of such compounds.

They are added to a wide variety of foods on the market. However, they are quite volatile and easily decomposed at high temperatures. Furthermore, they are not effective in vegetable oils and in preventing the development of initial off-flavours, such as the reversion flavour. However, it does not seem to retard the development of objectionable flavours.

In any event, there is a tendency for the consumers to reject synthetic antioxidants.

The possible toxicity of the synthetic chemicals used as antioxidants have been a subject of study for many years (it is known the effect on gastrointestinal tract mucosa and the conversion into toxic substances).

Therefore, great efforts have been done in order to find, extract, separate and identify safe and natural antioxidants.

## MATERIALS AND METHODS

- in this way we realised two samples of sugary biscuits: a sample control and a sample with pharmaceutical beta-carotene, of vegetal origin.

- the dosage of B-carotene was 0,1% referred to fat quantity, knowing that the biscuits are submissive to thermic treatment (baking)

- the way of work was the solubilisation of B-carotene in the necessary fat (palm oil) according to the recepty

- the beta-carotene has been chosen to be used like an antioxidant, knowing the fact that it is liposoluble and stable in alkaline medium

- the fat from the samples was extracted using the cold extraction with petroleum ether. It was not used Soxhlet method because it could break by thermic treatment the quality of the fat extracted.

- the antioxidant prepared from extraction of Rosemary showed an excellent antioxidant activity when added at a concentration of 0,02% in sun flower oil and in mixture (1:1) of sun flower oil-corn oil, used for fried potato chips.

- Tenox VI was used in some concentration as Rosemary extract

- It was determined as a chemical indicator the index of peroxide of the samples, using the volumetric method (thiosulphatometry) and the efficiency of the antioxidants used.

## RESULTS AND DISCUSSION

The experiments refer to samples of biscuits are presented in the table 1.

At the standard sample we can see that the peroxide value has the following percentage, increasing by the "0" moment:

-9.27% (in the second month)

-32.18% (in the fourth month)

-45.63% (in the sixth month)

**Table 1- Antioxidant activity of beta carotene in sugary biscuits**

Time (months)	0	2	4	6
I.P. standard sample (meq/kg)	11	12.07	14.54	16.02
I.P.B-caroten sample (meq/kg)	10	10.26	10.93	11.04
Eficacity (%)	9.1	15	24.8	31.08

At the beta-carotene sample we can observe that the peroxide value has the following percentage, increasing by the "0" moment:

-2.6% (in the second month)

-9.3% (in the fourth month)

-10.4% (in the sixth month),

without reaching the critical value of the peroxide value (max 12 meq/kg)

It was proved that the efficacy of the antioxidant increase from the initial value of 9,1% to the value of 31,08%, at the end of validity period.

The peroxide value of the oil extracted from potato chips which were fried in sun flower oil after the potato chips were aged at 60<sup>0</sup> C for various periods of

**Table 2-Antioxidant activity of Rosemary extract and Tenox VI in potato chips**

Potato chips fried in sun flower oil	Peroxide value (meq/kg) oil extracted from potato chips which have been aged at 60 <sup>0</sup> C ( for day)		
	0	2	7
No antioxidant (control)	5,1	9,4	92,3
Rosemary antioxidant (0,02%)	5,4	5,7	25,1
Eficacity (%)	5,8	39,36	72,8
Tenox VI (0,02%)	5,8	8,1	67,6
Eficacity (%)	13,72	13,82	26,76

At the standard sample we can see that the peroxide value has the following increasing by the "0" moment:

-8,431 ‰ (in a second day)

-170,98 ‰ (in a seven-th day)

At the Rosemary extract we can observe that the peroxide value has the following percentage, increasing by the "0" moment:

-5,55 ‰ (in a second day)

-36,48 ‰ (in the seven-th day)

At the Tenox VI we can observe that the peroxide value has the following percentage, increasing by the "0" moment:

-39,65 ‰ (in a second day)

-106,5 ‰ (in the seven-th day)

It was proved that the efficacy of the Rosemary antioxidant increase from the initial value of 5,8% to the value of 72,8%, and the efficacy of Tenox VI increase from the initial value of 13,72% to the value of 26,76%, at the end of validity period.

The Rosemary extract is clearly more efficient than Tenox VI for the improvement of flavour stability of potato chips.

The antioxidant effect of Rosemary extract in potato chips fried in mixture (1:1) of sun flower oil and corn oil, is shown in table 3.

**Table 3- Antioxidant activity of Rosemary extract and Tenox VI in potato chips**

Potato chips fried in mixture (1:1) of sun flower oil-corn oil	Peroxide value (meq/kg) oil extracted from potato chips which have been aged at 60 <sup>0</sup> C ( for day)		
	0	2	7
No antioxidant (control)	4	7,6	46,7
Rosemary antioxidant (0,02%)	4,5	4,9	12,2
Eficacity (%)	12,5	35,52	73,87
Tenox VI (0,02%)	5,5	6,5	40,5
Eficacity (%)	37,5	14,47	13,27

At the standard sample we can see that the peroxide value has the following increasing by the "0" moment:

-9 ‰ (in a second day)

-106,75‰ (in a seven-th day)

At the Rosemary extract we can observe that the peroxide value has the following percentage, increasing by the "0" moment:

-8,88% (in a second day)

-17,11‰ (in a seven-th day)

At the Tenox VI we can observe that the peroxide value has the following percentage, increasing by the "0" moment:

-18,18 ‰ (in a second day)

-63,63 % (in the seven-th day)

It was proved that the efficacy of the Rosemary antioxidant increase from the initial value of 12,5% to the value of 73,87%, and the efficacy of Tenox VI decrease from the initial value of 37,5% to the value of 13,27%, at the end of validity period.

We are obtained the decrease in the rate of formation of peroxides as an indication of the rate of autoxidation.

## CONCLUSION

The antioxidant activity of B-carotene and the efficacy of his utilisation increase the stability of the organoleptic and the physical-chemical properties of the sugary biscuits.

We mention that the only inconvenient at B-carotene using is the colour modification of the product(a small tent of orange).

It is recommended the consumption of products that contain B-carotene from natural sources, by knowing the terapeuthical and exceptional results in treatment and prevention of cancer.

The antioxidant activity of Rosemary extract can be demonstrated in both animal fat and vegetable oils.

This extract is able to improve the stability against oxidation of sun flower oil, corn oil, palm oil, as wel the stability of potato chips.

The Rosemary antioxidants has a lower volatility and better stability than Tenox VI at higher temperature, such as those is used in deep-fat frying.

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