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## IODINE INCORPORATION IN SUN FLOWER OIL

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**Indroduction**

Iodine deficiency is one of the major public health problems often co-existing in many regions in the world and affect more than one third of the world's population, including Republic Moldova [1, 2]. Approximate 85% of populations of Moldova live in iodine deficient regions [3]. In order to eliminate the iodine deficiency disorders, the government of Republic of Moldova adopted a National Program by the year 2004 [4]. However, all the measures taken in this direction, did not lead to significant improvement of the situation. Ministry of Health of Moldova with support of UNICEF in period from 1994 to 1997 studied, that 37% of the children in Moldova have goiter and only 32% of families consume adequate iodinated salt [3].

Iodine administration in products with a lipid origin represents a remarkable interest. This would allow the easy incorporation of the iodine in the food fatty products. The daily intake of lipids being limited would allow an easy regulation of the iodine consumption [5].

**1. Materials and methods**

• **Obtaining of the iodinated sunflower oil.** Double refined and deodorized sunflower oil was used [6]. To obtain the iodinated sunflower oil in one liter of oil 1g of chemically pure, crystalline iodine was administrated. The oil with the total iodine content 1000μg/ml, was diluted, obtaining products with iodine content of 100μg/ml, 10μg/ml, 1μg/ml.

• **Determination of physical and chemical indices of iodinated sun flower oil.** Iodinated sunflower oil was analyzed at the beginning of the study and dynamically during three months (once a month).

• **Chromatography analysis of fatty acids content in the sunflower oil.** The analysis of the fatty acids in the samples with iodinated oil was performed by gas chromatography with flame ionization detector, using gas chromatography (helium) HPCHEM 1 FID1 A. Fatty acids were separated depending on the length of the chain and depending on the non saturation degree. Concentrations were determined from the area of the pick using the standard curve of the authentic oil and the database.

▪ **P –anisidine index** [7]**.** P-anisidine index establishes the amount of unsaturated aldehydes (2,4-dienale, 2-alchenale) in products of animal origin, vegetal origin and oils through the reaction in unsaturated aldehyde from the sample with p-anisidine and then absorption determination at 350nm wavelength.

**2. Results and discussions**

The sunflower oil is a part of the vegetal oils group and has a high content of mono- and polyunsaturated fatty acids [8] and is characterized by a high number of sites capable to fix molecular iodine. The fixation of the molecular iodine takes place at the double bond with the formation of π type compounds, without breaking the double bond in the nonsaturated fatty acid molecules [9].

It was established that content of mono- and polyunsaturated fatty acids in iodinated and non-iodinated sun-flower oil does not vary greatly (table 1).

Physical and chemical indices of the iodinated oil do not vary greatly during 3 months of storage. Even for the sample with the highest iodine amount (1000 μg/ml) its value did not overtake the highest allowable amount. This proves that the administrated iodine does not bind to the double bond through covalent bonds.

Table 1. The composition of the fatty acids in the iodinated sunflower oil ($18^0$C).

| № | Type of oil | Conc. of iodine µg/ml | Concentration, % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $C_{14:0}$ | $C_{14:1}$ | $C_{16:0}$ | $C_{16:1}$ | $C_{18:0}$ | $C_{18:1}$ | $C_{18:2}$ | $C_{20:0}$ | $C_{20:1}$ | $C_{22:0}$ |
| 1 | Reference sample | - | 0,0846 | 0,07189 | 6,4610 | 0,0915 | 3,3749 | 22,3761 | 66,4074 | 0,4675 | 0,1466 | 0,5185 |
| 2 | 1:1000 | 1 | - | - | 6,4232 | - | 3,3858 | 22,3793 | 66,7023 | 0,5674 | - | 0,5421 |
| 3 | 1:100 | 10 | - | - | 6,4209 | - | 3,3772 | 22,2911 | 66,5791 | 0,7521 | - | 0,5796 |
| 4 | 1:10 | 100 | 0,0874 | - | 6,4205 | - | 3,3772 | 22,3376 | 66,6163 | 0,6349 | - | 0,5261 |
| 5 | 1:1 | 1000 | - | - | 6,4106 | - | 3,3369 | 22,2941 | 66,7722 | 0,6717 | - | 0,5145 |

P-anizidine index is an important index for the characterization of the oxidation degree of the fats especially for the evaluation of the formation of the secondary stable products due to fatty oxidation in food products.

During this study the evolution of the p-anisidine index for the iodinated oils in comparison with the reference sample depending on the technological factors which may interfere during usage of the iodinated oil was investigated. It was established that for the non iodinated oil the p-anizidine index increases during thermal treatment of the oil.

Also, in the case of the iodinated oil the p-anizidine index increases with the severity of the applied thermal treatment – temperature and duration of the treatment.

**Conclusions**

• During iodination and storage (3 months) physical and chemical properties of the iodized sun-flower oil vary insignificantly with regard to the reference sample. In case of oil iodination fixation of molecular iodine to double bond takes place with formation of π type compounds.

• It has not been seen any sensitive difference between the evolution of the p-anizidine index for the non iodinated and iodinated oil, which confirms the fact that the mechanism for the fatty oxidation in both cases is the same.

• Manufacturing and consumption of sun-flower oil and margarine fortified with iodine would be a cheap and accessible option for elimination of alimentary dependent iodine deficiency disorders.

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