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BIOLOGICAL RESERVE OF IODINE IN THE FORTIFIED FATTY PRODUCTS

Introduction. Iodine deficiency continues to be the most prevalent nutritional deficiency disorder in the world, affecting an estimated two billion people, in both industrialized and developing countries. In most countries, the best strategy to control iodine deficiency in populations is carefully monitored iodization of salt. The focus will be on understanding the scientific and technical developments to manufacture iodine-fortified products for mass production. Enhancing food processing technologies to fortify food with iodine might be one answer to deal with the current problems of dietary malnutrition and deficiencies [5, 7].

Three intervention strategies are available to prevent iodine deficiency. These are supplementation, dietary diversification, and both targeted and untargeted food fortification [1, 2]. The decrease of the consequences related to an insuficient iodine intake may be achieved through the application of a fortification strategy of different foodstuffs consummed by different population cathegories [5].

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 [4]. The daily intake of lipids being limited would allow an easy regulation of the iodine consumption.

In order to reveal the influence of iodination process on the indexes of quality of margarine, and for determination of it oxidative stability there were determined physical and chemical parameters of studied product.

Materials and methods.

1.1. Manufacturing of margarine fortified with iodine. In proposed iodinated margarine a part of sun-flower oil is replaced by iodinated double refined and deodorated sun-flower oil with content of iodine 10μg I/cm^3.

Fatty basis constitutes 82.00 – 80.25% and includes following ingredients: double refined and deodorated sun-flower oil; iodinated sun-flower oil with content of iodine 10μg I/cm^3; extract of natural colour, obtained from carrot, on basis of double refined and deodorated sun-flower oil; refined maize oil; vegetable monoglycerides (emulsifiers) and soya lecithin (emulsifier). Liquid phase constitutes 19.75-18.00% and includes following ingredients: nonfat dry milk; bakery salt; potassium sorbate and water.

1.2. Analysis of margarine fortified with iodine.

- Physical and chemical analysis (humidity and the volatile substance, melting temperature, acid number and content of NaCl);
- Organoleptical examination (appearance, colour, consistence, taste and smell).

All the measurements were made according to the standard methods and standards.

Results and discussion. The manufacturing process of iodinated margarine proposes obtaining food emulsion water/oil by means of succession realization of three mechanical processes: emulsification; cooling and maturation (Fig.1).

It is common knowledge, that halogens are capable of saturating double bonds present in the unsaturated lipids [3]. The addition of the active halogens to the double bonds is possible according to the mechanism of the nucleophile bimolecular substitution. The speed of saturation depends on the: nature of halogen; number of double bonds; position of these double bonds in the chain of fatty acid; structure of triglycerides.

It was established that, while the number of the carbon atoms between the carboxyl group – COO- and the double bond increases, the probability that the addition of the halogen reaction will take place decreases. Since fatty acids, present in sunflower oil have double bonds situated in the

position -9=10- and -11=12- (linoleic acid), the probability that the iodine addition in these conditions will take place is very low.

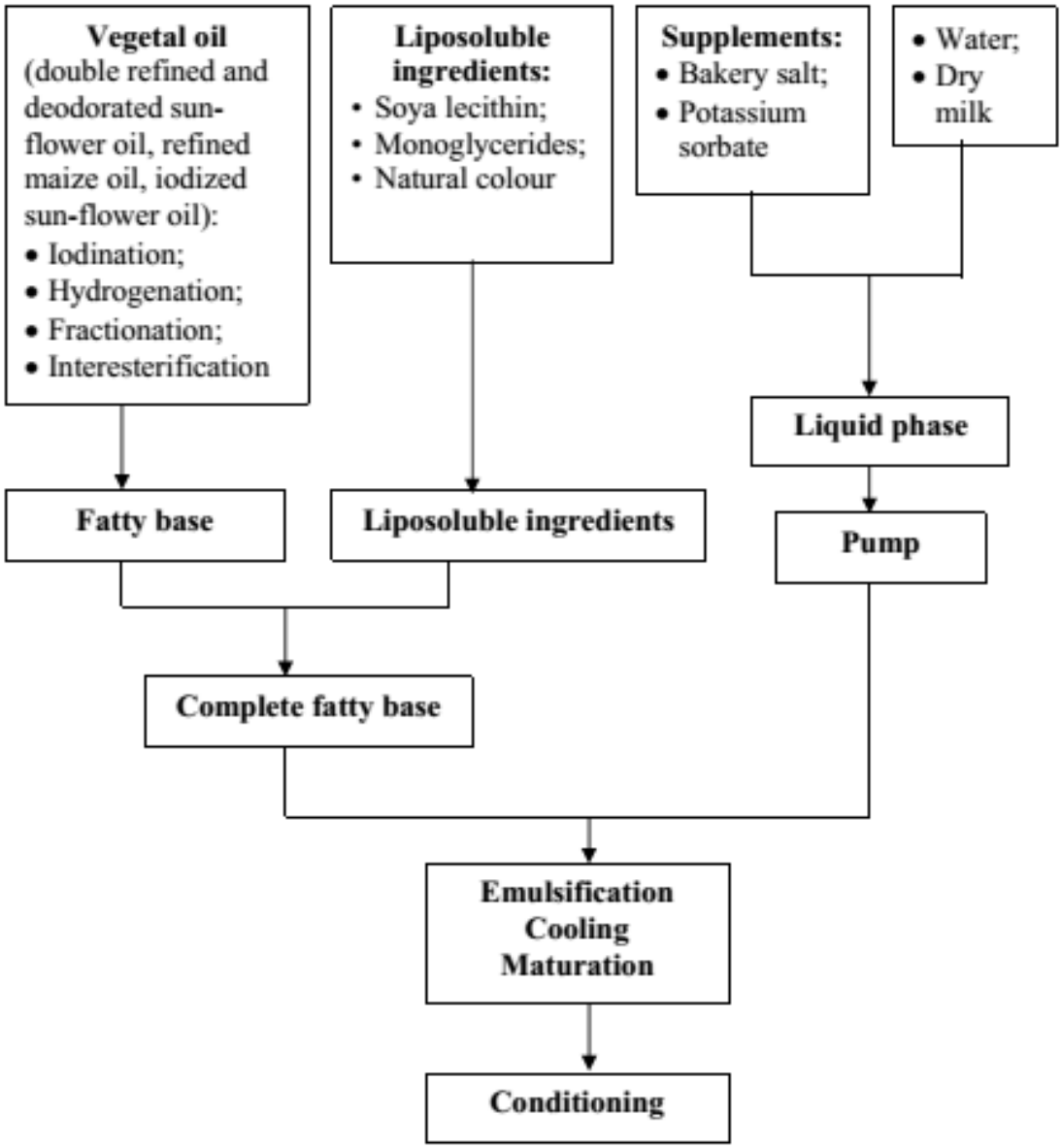

Fig. 1. The principle of iodinated margarine manufacturing

At the same time verification of grade of widening of the product confirms the non-variability of connections number. There has its place the fixing of iodine molecules on double connection of the fatty acids, non-enriched by formation of the compounds of π type.

Physical, chemical and organoleptical indices of iodinated margarine were determined in comparison with reference sample (table 1) according to the standard methods.

The physical and chemical properties of the margarine, which has an enormous importance for the food technology are determined by the chemical composition and their structure. Connection of iodine and vegetable oil gave the fixed organic connection with increased biological value, which is available for obtaining and does not require the creation of additional voluminous technologies. But the problem of rise of biological availability of iodine from its connections with fats is studies not sufficiently and needs specification.

Table 1 - **Physical, chemical and organoleptical indices of margarine fortified with iodine**

Physical and chemical indices	Reference sample	Iodinated margarine (1µg I/g product)
Appearance	Surface of cut is shining, dry at look	Surface of cut is shining, dry at look
Colour	Primrose with suggestion of golden	Primrose with suggestion of golden
Consistence (15^0C)	Homogeneous mass, doesn't crumb	Homogeneous mass, doesn't crumb
Taste and smell	Racy flavour of margarine with a pleasant aroma and freshness, without odour of oil	Racy flavour of margarine with a pleasant aroma and freshness, without odour of oil
Humidity and the volatile substance %, maximum	15.1±0.1	14.9±0.1
Melting temperature, ^{0}C	32±1	32±1
Acid number (20 ^{0}C)	0.132±0.002	0.130±0.002
Content of NaCl, %	0.51±0.1	0.47±0.1

Conclusions. Food manufacturing industry is actively involved in fortifying processed/semi-processed foods that are targeted toward like particular segments of the population. The efficacy of iodine fortification depends not only on the appropriate identification of the vehicle, but also on the stability of the form used for fortification, packaging, storage and the methodologies of quality assurance. Lipid iodine form proposed in this work for fatty food products fortification, complementary with potassium iodide which is the most common form of iodine used for salt fortification, would allow the prevention of iodine malnutrition/deficiency.

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