Content iodine in sauces of type emulsion

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Abstract

Introduction. The scarcity of natural resources arouse a necessity to find additional sources of protein, fat, carbohydrates, and their complexes with scarce mineral compounds. Therefore, a relevant issue is to enrich the diets deficient iodine compounds through research and development of new food products.

Materials and methods. Investigation of iodine content in emulsion-type sauces at all stages was performed using X-ray-fluorescence analyzer «Elvax». X-ray-fluorescence method consists of the appearance characteristic X-radiation of atoms of a chemical element at infringement they the primary X-ray irradiation.

Results and discussion. Investigated for the determination of organic and inorganic forms of iodine in content of food items, and installed the total loss of iodine in sauces after cooking and storage at +5 ... +10 ° C for 30 days. Using iodine-proteinaceous additive from 0.5 ... 2.5% by mass of iodine 0.01% can be achieved from 15 to 50% of the human daily requirement by iodine.

The resulting product does not lose its organoleptic, physico - chemical, consumer characteristics and meets the requirements of normative documents.

As a result of our research, it was found that the addition of the supplements enriched protein-mineral (SEPM) in composition sauces does not adversely affect the physical - chemical characteristics of sauces, but due to the stabilizing effect of additives iodine-proteinaceous increased emulsion stability up to 98 - 100% without additional food additives (emulsifiers).

This additive has passed a series of tests that indicate on compliance with requirements normative and technical documentation.

Conclusions. Used methodical approach allowed us to estimate the level of organic and inorganic iodine, as well as describe in more detail and correctly interpret the chemical composition of foods fortified with iodine and predict their health properties.

Introduction

Of particular importance to maintaining the state of human health and longevity has a full and a regular supply of body all necessary micronutrients: essential amino acids, vitamins and mineral components. And the most suitable and physiologically reasonable route of these components in the body -is alimentary.

Insufficient intake of micronutrients from food - is a common problem of modern humanity. It arose as a result of reduction in the intensity of exercise on the body, as a consequence - lower energy costs and a corresponding decrease in the total amount of food consumed by people. Against such deficits arise metabolic disorders and so-called "diseases of metabolic origin." These diseases occur when deficiency of essential amino acids, fatty acids and minerals. Relative deficiency of minerals most often the cause of serious diseases is the lack of iron, iodine, calcium, selenium, etc.

The most feasible, effective, and economically accessible by the way of radical improvement of provision of the population micronutrients is a regular inclusion in the diet foods in health purposes, enriched with micronutrients.

Must take into account the fact that the level of uptake of micronutrients from food influenced by several factors: a person's age, gender, lack of pathological conditions of the digestive system, the ratio of individual components of the diet and the relationship between individual micronutrients.

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Analysis of recent research shows that Ukraine is traditionally endemic region relative iodine deficiency. As a consequence, the structure of the metabolic pathology of origin accounts for a significant percentage of serious illnesses such as endemic goiter, short stature, deaf-mutism, disturbances of mental activity of children and adults.

Question iodine uptake by the human body is also associated with a number of problems. Iodine is absorbed by the body only in the state of a cation, in this form; it can form complexes with organic compounds, in particular with the proteins. However, in foods, it is basically in the state of the inorganic compounds in most cases, it corresponds to his anionic chemical form.

That is why one of the main functions of the thyroid gland of the human body is the conversion of iodine from anionic in a cationic state with subsequent formation iodine organic compounds necessary for normal biological processes of human.

Given the proliferation of thyroid disorders, a transformation of the population iodine may not always occur, which leads to the impossibility of assimilation by the body mineral iodine compounds.

Furthermore, it is known that iodine has radio protective properties, so adding it to the food will expand the range of products with radio protective properties, which is especially important for Ukraine, Belarus and Russia, as states the maximum affected by the Chernobyl NPP.

It is important to note the differences in the metabolism of organic and inorganic iodine associated with the regulatory function of the liver in this process. At the use of marine products (fish, non-fish marine hydrobionts, algae), which contains organic iodine, iodinated protein first under the action of proteolytic enzymes in the small intestine breaks down into amino acids, with one of them - tyrosine - iodine binds. Then iodinated amino acids via the portal vein enter to the liver cells - hepatocytes. The required amount of iodine

released into the blood and thyroid gland, and his excess through the biliary tract excreted from the body. The use of inorganic iodine that is absorbed in the stomach and does not pass the "filtration" in the liver may be the consequence of overdose of iodine and may cause iodine-inducing hyperthyroidism.

The aim of this work is to study the kinetics of iodine content in emulsion-type sauces made using additives iodine-proteinaceous during preparation and storage, as well as the application of a method for evaluating the content of organic and inorganic iodine in sauces emulsion type.

Materials and methods

For research were selected samples of emulsion type sauces with different content of additives mineral-enriched protein (AMEP) relative of egg powder, 0.5 ... 1.5% AMEP; Sauces emulsion type using AMEP (iodine-proteinaceous), which were submitted to the analysis, had the following characteristics:

- Appearance, consistency had uniform, creamy system, and was thick with single air bubbles.
- Taste and smell was neutral inherent in this type of mayonnaise, odors were not.
- The color was uniform throughout the mass had a creamy yellow color.

Organoleptic indicators are an important component in determining the quality of mayonnaise. On organoleptic indicators can determine the quality and freshness of mayonnaise.

In accordance with this have been developed formulations with content AMER 0.5 ... 1.5%. AMER added to the hydrated form in emulsifying basis to form a basis for a better distribution of the additive in the finished product. Other components were introduced by traditional technology.

For conducting research was used X-ray fluorescence analyzer «Elvax». X-ray-fluorescence method consists of the appearance characteristic X-radiation of atoms of a chemical element when excited by the primary by X-ray irradiation.

The fluorescence spectrum consists of a series of analytical lines. Each line corresponds to the energy of the fluorescent radiation characteristic for atoms of a given element. Since in the analyzer is used energy dispersive measurement method, then the resulting spectrum contains lines of all atomic elements located in the sample.

The energy range is from 1 to 40 KeV. This corresponds to a range of definitions the elements from Na to U. The intensity of spectral lines depends on the concentrations of elements determined. Pre-measured composition of pure filter paper and its spectrum is taken as a background. For calculation shall be taken the spectrum of the difference spectra taken a working sample and background.

Calculation of the mass fraction of the element produced according to the characteristics of the calibration of the analyzer. Calibration of the analyzer to determine the mass fraction of the element was performed using standard solutions of metal ions, which are used for calibration, certification and calibration of analytical instruments: photo colorimeter, spectrophotometers, atomic absorption spectrophotometers, etc.

Results and discussion

We created iodinated additive (iodine-proteinaceous) based on egg protein and mineral iodine compounds. Selecting objects due to expediency to ensure conditions of ion sorption İ-on protein molecules to form stable complexes.

Developed iodine-proteinaceous addition is a powdered system with can be used in a wide range of food health purposes, in particular in the technology of emulsion type sauces.

Based on knowledge about of the volatility and instability of inorganic iodine compounds, we carried out studies to determine the loss of iodine at the stage of preparation and storage of sauces emulsion type (Table 3). The iodine content in the emulsion sauce at all stages of determined using by X-ray fluorescence analyzer «Elvax».

Table 3

Kinetics of changes in the content of iodine in the emulsion-type sauces during cooking and storage

Indicator	iodine content mg/100 g	% loss from the beginning. content
The iodine content in the additive	207 ± 20	-
The iodine content in a freshly prepared gravy	146 ± 20	29,5
The iodine content after storage (t = +5 ... +10 ° C, τ = 30 days)	135 ± 20	7,2

Received data testify that the greatest loss of iodine occur during cooking. Probably this is due primarily to the fact that during the preparation of raw components to emulsify implemented pasteurization step (T = 70 ± 3°C, τ = 20 ... 25 ×60c) egg-mustard and milk mixture, in order to reduce the total bacterial contamination. Losses associated with iodine sublimation of inorganic iodine, which was in the system.

After preparation and storage at a temperature of +5 ... +10°C for 30 days the total loss of iodine in sauces is 37 ± 3%.

On the basis of the proposed method, we conducted a study to determine the relations of organic and inorganic forms of iodine in comprising of food. Based on literature data and on the volatility of inorganic iodine compounds, we carried out temperature control emulsion-type sauce using additives iodine-proteinaceous which applied a thin layer of less than 2 mm, the surface of the parchment paper. Mode of heat exposure was carried out at temperatures of 50 ... 60°C. (120) ×60 s. (Fig. 1).

Selection of temperature regime caused by need for process intensification on the background to avoid destruction of proteins and organic substances, which may lead to release of organic iodine and its loss. It was determined that after (110 ... 115) ×60 s. importance of iodine in food ceases to decrease and becomes stable. This is probably due to the complete sublimation of inorganic iodine compounds. The remaining amount of iodine is strongly linked to the protein, but not sublimate. According to the data this method, in test samples of the organic iodine content was 132 ± 3 mg per 100 g of product, i.e. decreased by 31 ± 2%.

Using additive iodine-proteinaceous from 0.5 ... 2.5% by mass of iodine about 0.01% can be achieved from 15 to 50% of the human daily requirement of iodine.

The resulting product does not lose its organoleptic, physicochemical, consumer characteristics and meets the requirements of normative documents

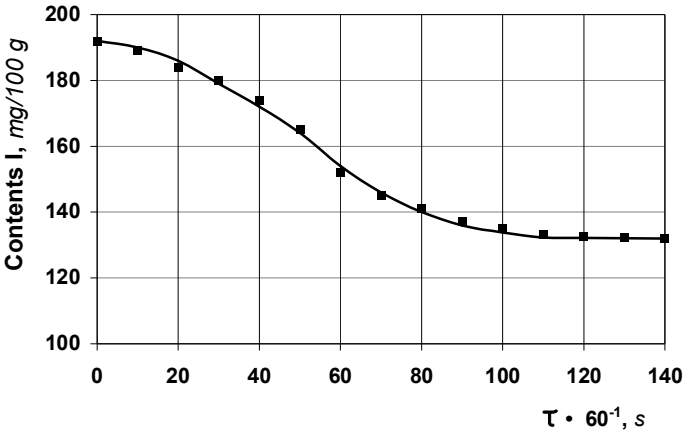

Fig. 1. Kinetics of changes in the content of iodine in the emulsion-type sauces during incubation (t = 50 ... 60°C)

As a result of our research, it was found that the addition to the composition of mayonnaise iodized food additive has no adverse effect on the physical and chemical characteristics of the sauces, but due to the stabilizing effect of additives iodine-proteinaceous increases resistance of the emulsion to 98 - 100% without additional food additives (emulsifiers).

This additive has passed a series of tests that demonstrate compliance with regulatory and technical documentation.

Conclusions

1. One of the key factors in improving the health of the population as a whole is to rationalize of nutrition since an unbalanced diet can cause quite serious violations in the body.
2. One way to solve the problem of unbalanced diet is the massive introduction of foods with health properties in the diets of consumers.
3. Topical issue is the enrichment diets of deficient iodine compounds through research and development of new food products fortified iodine-proteinaceous complexes
4. Given that the object of enrichment is advisable to use products of mass and daily food we have decided to choose as the object emulsion type sauces to enrich the bio-organic iodine compounds.
5. The carried out researches of physico-chemical parameters of the developed emulsion sauce evidencing of compliance regulations. These studies have identified the level of iodine and iodine resistance was studied at all stages of preparation and storage of the emulsion type in sauces manufactured using additives iodine-proteinaceous.
6. From the data obtained in test samples of organic iodine content compose 132 ± 3 mg per 100 g of product, i.e. decreased by 31 ± 2%. Although this level of iodine in the product sufficient to provide the daily requirement of iodine for human.
7. Used methodical approach allowed us to estimate the level of organic and inorganic iodine and as described in more detail and correctly interpret the chemical composition of foods fortified with iodine and predict their health properties.

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