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Electrophysical Methods in The Refrigerating Industry.

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ABSTRACT

In this article discusses trends in the further progress of modern refrigeration technology by reducing energy consumption in the production of artificial cold, and reduce losses in its consumption. One of the most effective ways out of this situation is the application of electrotechnology. Discussed the various options for the use of the achievements electrical technology in the refrigerating industry.

Keywords: electrotechnology, refrigerating industry, optimization of energy consumption.

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INTRODUCTION

One of the main tasks of the country's food security - reducing food raw material losses. In the field of food processing raw materials exist untapped opportunities, which could serve as additional reserves produce food. These reserves are associated with the elimination or reduction of such negative phenomena arising during processing, as a weight loss, a relatively low yield of the finished product, reducing its biological value, and others. However, to realize these opportunities based on traditional methods of treatment is extremely difficult, because these methods in its development closer to the natural limit of perfection [3, 6].

For refrigeration technology is characterized by a relatively slow flow of heat and mass transfer in machines refrigerators and canning foods cold. Main directions to solve this problem - the development of methods and means of intensifying the heat and mass transfer processes at the stage of production of artificial cold, and at the stage of its consumption. The methods and means should not adversely affect the quality refrigeration preservation of food [1, 9, 10].

According to forecasts of the International Institute of the cold in the foreseeable future large-capacity refrigeration preserving perishable products has no alternative. However, modern production of artificial cold - this is one of the major consumers of energy, on the production of which is spent non-renewable forms of fossil fuels (gas, oil and coal). Thus, in particular, energy consumption for production and cold storage 1 kg of meat account for over 21 kW / h [8].

In this regard, especially important to the development of cooling systems with intensified heat exchange, where energy consumption for production of cold is much less.

RESULTS AND DISCUSSION

Electrotechnology in comparison with the existing technology has a number of advantages: an electric field is applied directly on the raw materials of biological origin and environment, without intermediate transformation of energy that allows fine tuning of processes; It simplifies automation in connection with the control without an inert stream of charged particles; reduced energy consumption; intensify heat and mass transfer in devices and processes. Features electrotechnology used still woefully inadequate, but these opportunities in recent years have increasingly recognized specialists from various industries, which leads to the expansion of its field of application in industry. The versatility of this technology consists in the fact that in nature no such media and agents which have not been subjected to an electric field and the charge were not to charge carriers, i.e. would not have succumbed to the effects of the use of force field [2, 4].

Power field influence on the particle can be used in various processes, for example in the separation of pine nuts from small impurities or vapor refrigerant from the oil in the oil separator inclusions refrigeration units. Interest in the use of electrical technology in particular has increased in recent years with the advent of a number of countries in the energy crisis and rising to the environmental requirements. Working apparatus during processing of raw materials by biological origin with using of high electric fields are performed by dry method (without water consumption), it does not require an expensive wastewater treatment and environmentally clean [5, 7].

The reality of this trend is reinforced by the tendency change in energy balance. Over time, greater priority will be given just electricity.

The use of energy fields in industrial production - a complex scientific and technical task that requires solving a number of issues, in particular such as:

- identify areas of production, where the cost-effective use electrical methods based on rational combination with traditional technology;
- study of the complex characteristics of the product: the electrical, structural and mechanical, thermal and others and establish their relationships;
- study heat and mass transfer processes in the conditions of the use of new sources of concentrated energy;
- development of theoretical bases of calculation and design of devices for refrigeration food processing in the energy fields;

- comprehensive assessment of the quality of products.

The classification of electrophysical methods of food processing based on the principle continuity of the electromagnetic spectrum.

The basis of the action of one of the electrical methods are based on electrotechnology, using the action of strong electric fields. Receiving the strong electric field is achieved by means of simple constructive solutions, which opens up opportunities for their use not only in experimental studies, but also in the implementation of the enterprises of agroindustrial complex.

One of the ways of intensification of heat and mass transfer during the cooling treatment (cooling, freezing, thawing, and atmospheric freeze-drying) is to use electroconvective airflow.

In the industry are beginning to find application freezers using strong electric fields for the intensification of refrigeration food processing. It becomes possible to use the electrotechnology and the storage of frozen products.

One of the areas of electrotechnology is the electron-ion treatment (EIT). Preservative food, one type of EIT, allows to keep the quality at refrigeration and storage processing.

The use of electrical stimulation allows to maintain the quality of chilled meat, accelerate ripening, improve the consistency of meat, slow down hydrolytic and oxidative processes in adipose tissue by freezing carcasses in the pair state, and also to reduce the weight loss during thawing.

Using the microwave heating can significantly intensify the processes of food production, are associated with heating of products, for example such as thawing and sublimation, as well as to develop new, in particular by combining the microwave heating with conventional methods electricity. Microwave heating retained the quality of products and improved sanitary and hygienic conditions.

Prospective application of electrotechnology in main and auxiliary devices chillers (air cooled condensers, oil separators, etc.) that allows you to increase the effectiveness of their work.

The formation of frost on the surface of the heat exchange chamber hardware significantly affects its working environment: reduced heat transfer rate due to the appearance of additional thermal resistance and worsen the aerodynamic characteristics of machines. Using electric convection in the chamber allows to intensify heat transfer equipment and increase the duration of the chamber equipment without thawing.

In recent years, attracted the attention of specialists cryo separation of biological raw materials in an electric field, which expanded the possibilities of application of new electro physical techniques to reduce raw material losses and preserve the quality of food.

As a high-voltage source used in devices (Electro separators, oil separators, heat exchangers, etc.), widely used electrical equipment from other areas of engineering. Operation of this equipment is characterized by high reliability. The advantages of its compact size also applies.

CONCLUSION

Scope of electrotechnology is expanding rapidly, and listed directions are only one example of the broad possibilities of using electro physical methods. However, the analysis made it possible to once again confirm the high prospects of using electro physical methods.

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