YASHIL IQTISODIYOT va TARAQQIYOT

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MAQOLALAR TO‘PLAMI

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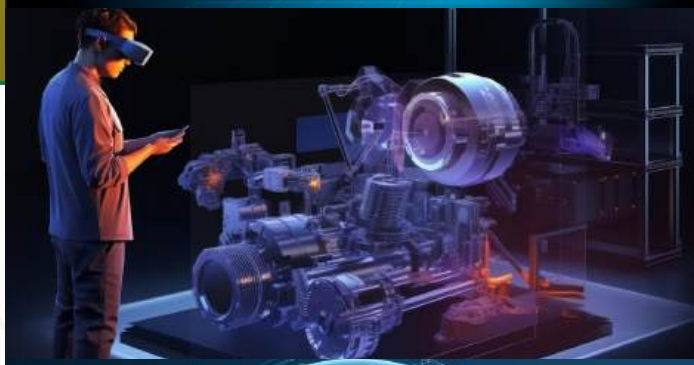

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“ZAMONAVIY IQTISODIYOTDA YUQORI MUHANDISLIK TEXNOLODIYALARINI ILMIY-AMALIY JORIY ETISH INNOVATSION TARAQQIYOT POYDEVORI”

MAVZUSIDAGI ILMIY MAQOLALAR TO‘PLAMI

PRODUCTION OF TOMATO PASTE

Ergasheva Muhabbat Komil kizi
Researcher, Bukhara Institute of Engineering and Technology

Abstract: In the article, the authors provide material on the essence of the process and factors affecting the quality of tomato paste, evaporation using a pressure difference.

Key words: tomato mass wiping, heating, boiling, vacuum, concentration,pressure drop.

Annotatsiya: Maqolada muallif tomonidan jarayonning mohiyati va tomat pastasi sifatiga ta'sir qiluvchi omillar, bosim farqi yordamida bug'lanish bo'yicha ilmiy-tadqiqot olib borilgan.

Kalit so'zlar: pomidor massasini tozalash, isitish, qaynatish, vakuum, konsentratsiya, bosimning pasayishi.

Аннотация: В статье авторы приводят материал о сути процесса и факторах, влияющих на качество томатной пасты, выпаривание с использованием разности давлений.

Ключевые слова: протирание томатной массы, нагрев, кипячение, вакуум, концентрирование, перепад давления.

INTRODUCTION

Among the vegetables grown in Uzbekistan , tomatoes are the most popular and widespread, occupying a high place in terms of gross harvest. Tomatoes make up 35-38% of the total area of vegetable crops. In particular, ripe tomatoes contain up to 25 mg % of vitamin C, approximately 1 mg % of carotene, vitamins B1, B2, PP (vitamin B5), folic acid; malic, citric, succinic and oxalic acids and up to 5% of carbohydrates. They are sources of mineral ions: potassium, sodium, iron, magnesium, calcium, phosphorus, iodine, and other macro-and micro-elements. The biochemical composition of tomato fruits is as follows: dry matter 0.6-6.6 %, protein 0.95-1.0 %, sugar 4.0-5.0 %, oils 0.2-0.3 %, fiber 0.8-0.9 %, ash 0.6 %, organic substances (apple, citric acid) 0.5%, vitamin C (ascorbic acid) 19-35 mgcarotene (provitamin A) 0.2-2 mg / kg, thiamine (B1).

Concentrated tomato products include tomato puree and tomato paste. They are obtained by boiling the mashed tomato mass. The concentration of dry substances in tomato puree is 12, 15 and 20%, in tomato paste-25, 30, 35 and 40%. The main type is 30% tomato paste. Salted tomato paste is also available with a dry matter content of 27, 32 and 37%.

LITERATURE REVIEW

Corporating quantitative analysis and meta-analysis techniques can enhance the depth and impact of the reviews.

Dr. Rodriguez has conducted extensive research on the impact of processing parameters (temperature, time, pressure) on the quality attributes of tomato paste, such as color, flavor, texture, and nutritional value. Her work has led to the development of advanced process control systems that optimize energy consumption while maintaining product quality. Additionally, Dr. Rodriguez has investigated the potential of novel thermal processing technologies to improve the efficiency and sustainability of tomato paste production.

Dr. Chen is a leading expert in foodborne pathogens and their control. His research has focused on the identification and characterization of microorganisms associated with tomato and tomato products. Dr. Chen has developed rapid and sensitive detection methods for pathogenic bacteria in tomato paste, contributing to improved food safety practices. His work has also emphasized the importance of good manufacturing practices (GMP) and Hazard Analysis and Critical Control Points (HACCP) in preventing microbial contamination.

Dr. Patel's research centers on the recovery of bioactive compounds from tomato processing waste, such as lycopene, antioxidants, and dietary fibers. She has developed innovative extraction and purification technologies to produce high-value ingredients from tomato by-products. Dr. Patel's work has contributed to the development of functional food products enriched with tomato-derived bioactives, promoting sustainable and value-added utilization of tomato resources."

RESEARCH METHODOLOGY

In the implementation of these research works, widely used methods in scientific research methodology were used. In the process of scientific analysis, these scientific research methods, in particular, observation, generalization, grouping, comparison, analysis, and synthesis and analysis methods were widely used.

ANALYSIS AND RESULTS

Tomato pulp is a tomato product that goes through several stages of technical processing. Tomatoes are delivered to the plant in two forms: tomato pulp (crushed mass) or the whole crop.

Tomato pulp-semi-finished product is transported in tank trucks or bulk barges in accordance with the rules of food cargo transportation, provided that the total duration of storage of tomato pulp at the point, transportation and storage at the plant before processing should not exceed 4 hours. Before draining the semi-finished tomato pulp from the tanker truck, the drain pipe is thoroughly washed with water from the hose. To remove the thick mass of tomato pulp that has settled to the bottom of the tank, it is necessary to use a cold mashed tomato mass. The use of water for flushing is not allowed. Receiving containers for draining tomato pulp for processing sh ould be equipped with agitators or recirculation devices that ensure its uniformity. The rough-mashed tomato pulp delivered to the cannery is heated to a temperature of 75±5°if it is necessary to store it to ensure uniform loading of production during the day.With the steam-contact method of dry purified saturated steam or in multi-pass tubular heat exchangers. Preheated tomato pulp is fed to a wiping machine with a diameter of holes in the screen of 1.2 mm, and then finished through sieves with a diameter of holes of 0.4 mm. After finishing, the tomato pulp is heated to a temperature of 93±3°C and are cooled to 23 °C in heat exchangers. Tomatoes arriving at the plant as a whole are fed to the primary processing line in the order of arrival at the raw material site, taking into account the quality condition of each batch. Feeding is carried out using a hydraulic conveyor. It is a chute located with a slope of 10-12 mm per 1 m of length in the direction of movement of water and raw materials.

The flow velocity in a hydraulic conveyor is determined by the formula where C is the roughness coefficient (for cemented hydraulic conveyors of tomato lines C=26.5); R is the hydraulic radius (the ratio of the cross-sectional area of the ceiling to the underwater or wetted perimeter); I is the slope of the channel (0.08-0.12). Water consumption per 1 kg of tomatoes is about 4 dm3. It is recommended to install traps in the bottom of the hydraulic conveyor chute to capture heavy impurities.

When loading tomatoes, a portable hopper should be installed in the water dispenser. When unloading tomatoes from all types of transport containers, the height of fruit falling to the water mirror is recommended to be no more than 0.5 m.[1] Washing tomatoes. Tomatoes are delivered from the hydrotransporter to the washing machines via a water separator. Tomatoes are washed to remove visible dirt — earth, clay, sand and other mechanical impurities and most of the microorganisms and pesticides in two series-installed washing machines, which ensure the flow of water, draining and turbulization due to the operation of blowers. Water consumption for washing tomatoes is set at the rate of 2-3 dm3 per 1 kg of tomatoes. After washing, tomatoes are rinsed under the shower on the remote conveyor of the washing machine.

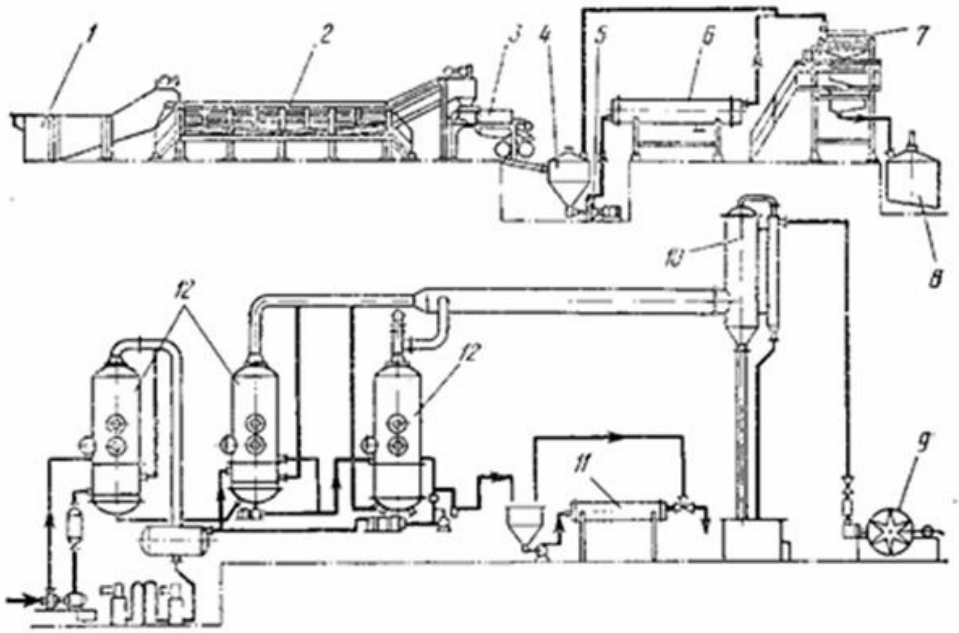

Diagram of a mechanized tomato paste production line:

1-washing machine; *2*- inspection conveyor; *3*-crusher and seed separator; *4*-collection of crushed mass; *5*-pump; *6*-preheater; *7*-wiping machine; *8*-collection of mashed mass; *9*-air pump; *10*-condenser; *11*-steam heater; *12*-vacuum-evaporation appparts.

The temperature of the crushed mass before wiping is regulated in the range of 60-90 °C. It affects the quality of the product. So, with the cold processing method, the mass is heated to a temperature of 60-67 °C and a bright red product is obtained. Waste during wiping, depending on the raw material, is 5-8%. In the hot method, the crushed tomato mass is heated to 80-90 °C, the resulting mass is dense, and the waste is 4-6%.[2]

Wiping the tomato paste. To obtain a homogeneous crushed mass, as well as to separate the skin, remaining seeds, coarse fibers, the heated tomato mass is sent to a built-in wiping machine (triplex) of the T1-KP2T type, which has nodes for regulating the advance angle and the gap between the scourge and the sieve, in which the skin and remaining seeds are removed on the first sieve with a hole diameter of 1.2 mm. then, on the second screen with a hole diameter of 0.8 mm, all fibers are removed and on the third screen with a hole diameter of 0.4 mm, the final mass is wiped until a fine consistency is obtained.[4]

The mashed tomato mass is subjected to sterilization, for which multi-pass tubular heat exchangers and coolers are used. Processing is carried out at a temperature of 125 °C for 70 seconds or at a temperature of 130 °C for 55 seconds (for a mass with a pH above 4.4). The mass is fed for sterilization by pumps that ensure the product pressure at the outlet of the sterilizing system is not lower than 280 kPa. The sterilized tomato mass is not cooled before being fed to vacuum evaporation units with remote heating surfaces, but is sent through a pressure reducing valve to the separator of the first case (by product). For devices with the location of the heating surface inside the body, the tomato mass after the soaker is cooled to a temperature of 85±2°C in order to avoid product losses with juice vapors[3]. Cooling can be carried out by self-evaporation in a container at a pressure equal to or less than atmospheric. For vacuum evaporation units with remote heating surfaces, it is allowed to sterilize the tomato mass after partial concentration in the first case. In this case, the mashed, prepared tomato mass is sent to the first body of the vacuum evaporation unit, concentrated to approximately 8% by mass of dry substances, then sterilized according to the same modes as for the initial mass, and then sent tangentially to the separator of the subsequent body, if the difference between the boiling point in this body and the temperature of the incoming product does not exceed 50 °C. If the specified temperature difference exceeds 50 °C, then the mass should be cooled before entering the subsequent device.

An experiment was conducted on evaporation of tomato pulp using a pressure drop, the atmospheric pressure was increased to 8 atmospheres. When the tomato mass is evaporated at high degrees, the quality of the product significantly deteriorates, and heating the tomato in the heat exchanger leads to the formation of scale. And the use of pressure to evaporate tomatoes can serve as a solution to these problems, as you know, with a pressure drop, the moisture from the products evaporates and the consistency thickens. Also, useful elements retain their properties. Also, there is no bitterness in the taste of tomatoes.After the experiment, the tomato has a bright red color but not thick enough in consistency.

CONCLUSION

This method of evaporation of tomato pulp may be suitable for partial evaporation, but not full.Evaporation by pressure difference allows you to save enough time and resources.In the course of the experiment, I found that the temperature decreased by one degree which provides oportunity to keep vitamines and minerals stable and the colour of tomato pulp stay unchanged.

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5. Ergasheva Muhabbat Komil kizi
6. Researcher, Bukhara Institute of Engineering and Technology
7. Telephone number (95) 707 78 64 e-mail mukhabbater1@gmail.com

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