Improvement of Energy Efficiency of Dehydration Processes in the Conditions of Selective Supply of Electromagnetic Energy

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Abstract. An analysis of conventional dehydration processes used in food technologies—evaporation and drying—has been conducted, and their key challenges have been identified. The global research experience in dehydration technologies based on innovative microwave energy sources is reviewed. The studies carried out indicate that dehydration in an electromagnetic field holds clear promise both in terms of reducing energy consumption and improving the quality of the final product. At the same time, the existing research has been conducted using laboratory-scale setups; comprehensive studies and engineering design methods for electrodynamic—type equipment are lacking. The aim of this work is to develop the scientific foundations of dehydration processes under conditions of selective electromagnetic energy supply, to formulate design methods for continuous—flow dehydrators, and to create and test an experimental prototype of an electrodynamic dehydrator. To achieve the stated goal, the authors have synthesized previous research—where they hold priority—and formulated a hypothesis for the creation of apparatuses that address the scientific and technical contradictions inherent in traditional technologies. It is demonstrated that, under selective energy supply conditions, solutions can be concentrated within a single unit. The paper analyzes transformation schemes within the dehydrator, a parametric model, and the design of the experimental prototype. Results on the quality of obtained concentrates are provided. The most important outcome of the work is the development of theoretical foundations for dehydration in a microwave field, yielding high-quality concentrates. The significance of the study lies in the creation of an energy—efficient electrodynamic unit that replaces conventional evaporators and dryers.

***Keywords*:** dehydration processes, microwave field, electrodynamic systems, evaporation, drying, production technological equipment, nutrition technologies.

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Majorarea eficienței energetice a proceselor de deshidratare în condiții de alimentare selectivă cu energie electromagnetică

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Rezumat. Articolul prezintă analiza proceselor tradiționale de deshidratare a materiilor prime în tehnologiile alimentare – evaporare și uscare și sunt definite problemele cheie ale acestora. Este analizată experiența mondială a cercetării tehnologiilor de deshidratare bazate pe surse inovatoare de microunde. Studiile efectuate indică faptul că deshidratarea în câmp electromagnetic are perspective necondiționate, atât în sarcinile de reducere a intensității energetice, cât și în sarcinile de calitate a produsului finit. Totodată, studiile efectuate au fost efectuate pe standuri de laborator, dezvoltarea și testarea echipamentelor electrodinamice nu au fost găsite în literatura disponibilă. Prin urmare, scopul lucrării este de a crea un model experimental al unui deshidratator electrodinamic. Pentru atingerea acestui scop s-a realizat o generalizare a studiilor, a căror prioritate revine autorilor. Se formulează o ipoteză pentru crearea unor dispozitive care să rezolve contradicțiile științifice și tehnice ale tehnologiilor tradiționale. Problemele de evaporare și uscare sunt rezolvate într-un singur dispozitiv. Sunt analizate consecvent schemele de transformare în deshidrator, modelul parametric și proiectarea probei experimentale de plante. Sunt prezentate rezultatele testării deshidratorului în modurile de funcționare periodică și continuă. Sunt prezentate rezultatele calității concentratelor obținute. Cel mai important rezultat al lucrării este că au fost dezvoltate fundamentele teoriei deshidratării într-un câmp de microunde în condiții de producție cu indicatori înalți ai calității concentratului. Semnificația lucrării este că a fost creată o instalație electrodinamică eficientă din punct de vedere energetic, care înlocuiește evaporatoarele și uscătoarele tradiționale.

Cuvinte-cheie: procese de deshidratare, câmp cu microunde, sisteme electrodinamice, evaporare, uscare, echipamente tehnologice de producție, tehnologii de nutriție.

Повышение энергоэффективности процессов дегидратации в условиях селективного подвода электромагнитной энергии

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Аннотация. Проведен анализ традиционных процессов обезвоживания сырья в пищевых технологиях – выпаривания и сушки. Определены ключевые проблемы выпаривания: снижение интенсивности процесса с повышением концентрации, формирование пограничного слоя, снижение качества готового продукта. Сформулированы проблемы традиционных сушильных технологий: низкая интенсивность диффузионных процессов и высокая энергоемкость оборудования. Анализируется мировой опыт исследований технологий обезвоживания на базе инновационных источников селективного объемного подвода энергии микроволнового диапазона. Выполненные исследования свидетельствуют, что обезвоживание в электромагнитном поле имеет безусловные перспективы, как в задачах снижения энергоемкости, так и в задачах качества готового продукта. Вместе с тем, выполненные исследования проведены на лабораторных стендах, отсутствуют обобщающие исследования и методы инженерного проектирования оборудования электродинамического типа. Целью работы является разработка научных основ процессов обезвоживания в условиях селективного подвода электромагнитной энергии, методов проектирования дегидраторов непрерывного действия, создание и испытание экспериментального образца электродинамического дегидратора. Для достижения поставленной цели проведено обобщение исследований, приоритет в которых принадлежит авторам, сформулирована рабочая гипотеза создания аппаратов, которые решали бы научно-технические противоречия традиционных технологий, показано, что в условиях селективного подвода энергии можно концентрировать растворы в одном аппарате. Поскольку, задачи и выпарки, и сушки решаются в одном аппарате, используется термин дегидратация. Последовательно анализируются схемы трансформации в дегидраторе, параметрическая модель и конструкция экспериментального образца установки. Приводятся результаты испытаний дегидратора в периодических и непрерывных режимах работы. Рекомендуются параметры режимов работы дегидратора, оптимизированные по энергетическим и технологическим параметрам. Приведены результаты качества концентратов яблочного и виноградного соков, сухих ягод актинидии. Наиболее важным результатом работы является то, что разработаны основы теории дегидратации в микроволновом поле с высокими показателями качества концентратов. Значимость работы заключается в том, что создана энергоэффективная установка электродинамического типа, заменяющая традиционные выпарку и сушилку.

Ключевые слова: процессы дегидратации, микроволновое поле, электродинамические системы, выпарка, сушка, технологическое оборудование производств, технологии питания.

INTRODUCTION

In recent years, there has been a rapid increase in the number of publications devoted to the study of food raw material processing in an electromagnetic field of the microwave (MW) range. The growing interest in microwave technologies is due to the unique characteristics of the interaction between food materials and electromagnetic energy sources. First, technologies where energy is applied to the surface, microwave energy is supplied volumetrically. Secondly, this is not superficial (as it is in traditional technologies), but rather a volumetric energy transfer. Third, energy here is selective energy transfer to the polar molecules of the solution. Second, unlike traditional is delivered under second—kind boundary conditions, rather than third-kind conditions. These specific interactions enable innovative solutions aimed at reducing energy consumption, intensifying processing, and improving the quality of the final product. The vast majority of studies focus on dehydration processes in the most energy-intensive operations — namely, drying.

The research objects are moist raw materials. As a result, recommended processing modes are proposed, and the possibility of improving the quality of the final product is confirmed, including its use in functional nutrition and in dietary supplements for preventive and medical applications.

Typically, such studies examine the effect of the field on water, alcohol, acetone, and similar molecules in laboratory-scale setups. The objectives of this article are to conduct research aimed at developing theoretical foundations, as well as the creation and testing of experimental units for the dehydration of plant—based food raw materials.

Problem Statement and Research Objectives

In 2024, a study was conducted at the Middle East Technical University (Turkey) on the dehydration of sucrose using a microwave vacuum evaporator [1]. The initial sugar—alcohol solution had a concentration of 70°Brix, so the primary objective was sucrose crystallization. As a result, it was noted that microwave technologies significantly accelerate crystallization compared to traditional methods.

In 2021, research on the dehydration of barley malt under microwave field conditions was carried out at the University of São Paulo and the Federal University of Santa Catarina (Brazil) [2]. For comparison, traditional convective drying (50–70°C) was performed, which lasted 9–14 hours, whereas the microwave drying process reduced the duration by approximately 95%. In addition to microwave energy input, the system was vacuumized, which significantly increased the steam productivity of the unit and lowered the process temperature.

In 2024, researchers at Cornell University (USA) studied the effect of microwave energy under vacuum conditions on the cream drying process [3]. The process temperature did not exceed 65°C, with pressure ranging from 2.2 to 2.8 kPa. The resulting dried cream, after reconstitution, whipped significantly better and had a much longer shelf life compared to products obtained through freezing or butter conversion.

That same year, the Technical University of Munich (Germany) investigated the freeze-drying process of maltodextrin under microwave energy input [4, 5]. The field power ranged from 120 to 220 W (1.00—1.83 W/g) at a temperature not exceeding 40°C.

In study [6], researchers from Maejo University (Thailand) and Putra University (Malaysia) tested a closed-loop control system to improve microwave sublimation drying. Carrot slices were chosen as the object of study. The microwave power levels were 100, 200, and 300 W, and the process temperature ranged from 15°C to 40°C. The final moisture content of the product was 6%.

In 2022, at China Agricultural University, the challenges of heating liquid and semi-liquid food media under microwave field conditions were investigated [7].

Additionally, an analytical review was conducted on the prospects and capabilities of various energy sources in solving heat and mass transfer problems, including microwave energy supply [8]. Based on studies of agricultural products, it was noted that the positive effect of microwave exposure is enhanced when combined with infrared (IR) treatment. However, due to the wide variability in raw material structure, process control is quite complex, prompting the use of sensor and computer technologies, neural networks, and other advanced tools.

In 2023, a joint study conducted by China Agricultural University, Jiangsu University (China), Australian Catholic University, and the Guangxi Academy of Sciences (China) examined the effects of microwave radiation and ultrasound in the processing of food raw materials [9]. Analysis of the research results showed that the synergy between the heating effect of the microwave field and cavitation induced by ultrasound significantly increases processing efficiency.

Similar studies were carried out in 2024 at Yangtze University (China) and the National Innovation Center for the Polymer Materials Industry (China), where the potential of this approach was also emphasized [10].

That same year, at the Agricultural University (Pakistan), with the participation of Jiangsu University, Foshan University, and South China University of Technology (China), a study was conducted on the evaporation of grape juice under microwave field and vacuum conditions [11]. The process parameters varied within the following ranges: microwave power — 30–80 W, pressure — 35–70 kPa, and duration — 5–15 minutes. The final concentration of the product was approximately 78°Brix.

It is worth noting that microwave energy does not have a negative impact on the valuable components of food raw materials.

For instance, in 2021, researchers from the University of São Paulo and Mauá Institute of Technology (Brazil) studied the microwave processing of coconut milk [12], with the main goal being the inactivation of *Bacillus coagulans* bacteria.

The results indicated that food sterilization using microwave radiation is a promising method that preserves the quality of the product itself.

Studies [13, 14] highlight the advantages of microwave radiation in processes such as drying, heating, baking, cooking, frying, and more.

The authors argue that the use of such an energy source helps better preserve the quality of raw materials and significantly reduces processing time, which positively affects energy consumption.

Interactions between microwave fields and other types of solvents, the most common of which are ethanol and acetone, are also being studied.

For example, in 2021, a joint study by researchers from the Autonomous University of Coahuila (Mexico) and the Catholic University of Portugal was conducted on the microwave extraction of valuable components from avocado peel [15].

The extractant used was a solution consisting of acetone and ethanol in different proportions. The extraction process took place at temperatures between 65—75°C. The resulting extracts had high polyphenol content and strong antioxidant activity.

The conducted analytical review of the literature allows the following conclusions to be made:

1. Microwave technologies are widely and successfully applied around the world.
2. Microwave technologies have significant prospects in the processing of plant-based raw materials in the food and pharmaceutical industries.
3. Research on microwave technologies in the available literature is limited to laboratory—scale setups.
4. The effect of the electromagnetic field on homogeneous systems (water, alcohol, acetone) has been studied.
5. The effect of the electromagnetic field on complex food raw material complexes, which include polar molecules, has not been studied.

Based on the conclusions drawn, the following research tasks are set:

1. To develop the scientific and technical foundations for the design of electrodynamic dehydrators with continuous operation.
2. To conduct tests of an experimental prototype dehydrator in juice concentration.
3. To conduct tests of an experimental prototype dehydrator in berry dehydration.

In solving these tasks, two hypotheses are formulated.

Hypothesis 1: "Differences in the electrophysical properties of juice components can be used to direct electromagnetic energy specifically to water, effectively using energy only for the phase transition, thus eliminating all issues related to heat transfer in concentrated solutions."

Hypothesis 2: "The parameters of the electromagnetic field can be used to control the dehydration process of raw materials with a solid capillary-porous structure by selectively directing energy to water molecules within the raw material."

Energy Efficiency of the Technology with Electromagnetic Dehydrator

Currently, juice concentrates are produced through the sequential processing of raw materials in vacuum evaporators and spray dryers [16, 17]. Due to issues with the formation of a viscous boundary layer on the heat transfer surfaces of evaporators, the final concentration of the concentrated product is limited [18, 19].

This concentration depends on the type of raw material and ranges from 25 to 45%. Further concentration is carried out in energy-intensive spray dryers. To objectively compare the energy characteristics of traditional and innovative concentration technologies using different energy sources, the authors analyze both the specific energy consumption coefficient J and the required specific fuel consumption d. The parameter J represents the energy consumption per 1 kg of finished product (MJ/kg). The parameter d indicates the required fuel consumption per 1 kg of finished product (m^3/kg).

The conversion of fuel energy in the components of traditional systems is analyzed by the authors in the study (Burdo O.G., *Problems of Regional Energy,* 2017).

A scenario was investigated where the amount of moisture removed during both evaporation and drying is equal. Similarly, an analysis of the innovative system with a dehydrator is performed (Fig. 1).

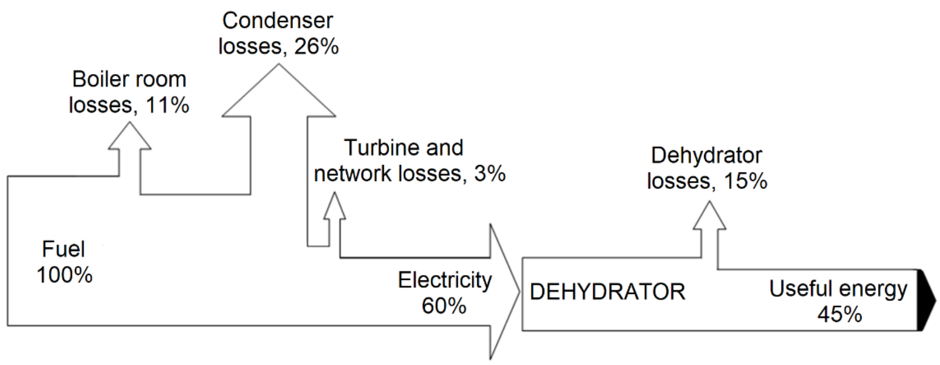

Fig. 1. Energy conversion in the innovation technology of food concentrates obtaining.

In diagram (Fig. 1), a modern power plant with a gas turbine is investigated. However, even in the case of a steam turbine, the innovative technology with a dehydrator requires 6% less of fuel consumption. As the proportion of drying increases, the efficiency of the technology with an electromagnetic dehydrator will improve.

Often, the primary priority is to maximize the retention of the food potential of the raw material in the finished product. In this case, traditional drying cannot compete with the proposed system with an electromagnetic dehydrator.

A systems analysis of the energy and mass flows in the dehydrator takes into account the influence of the environment, the power of the magnetrons, the air in the system, the properties of the raw material, and the key components of the system (Fig. 2).

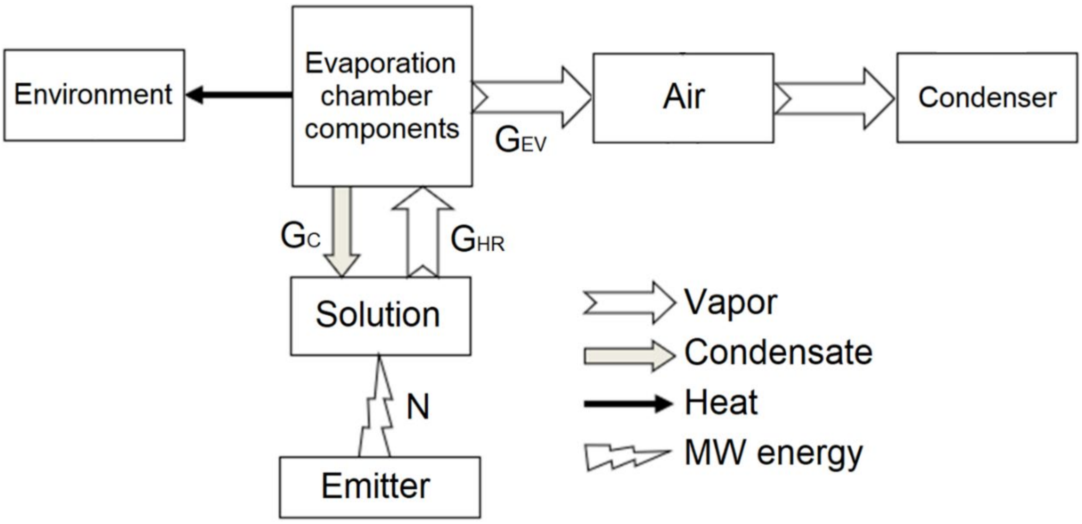

Fig. 2. Scheme of mass and energy flows in the dehydrator.

The main result of the complex interaction of processes will lead to a change in conditions within the volume of the module — the reactor.

At the new level, dynamic equilibrium will be established based on the conditions of thermal and material balance. The key elements of the thermophysical system include: magnetron 1 with power N and efficiency η; solution 2; assemblies of the reactor and resonator shaft 3; air inside the reactor and condenser 4; condenser 5 with surface area F; and the surrounding environment 6 (Fig. 2).

The next stage of the research involves modeling the processes (Fig. 2) within the reactor and the resonator shaft.

Modeling of Dehydration Processes in an Electromagnetic Field

The first stage of modeling involves the investigation of the parametric process model (Fig. 3). The main assemblies of the dehydrator are the resonator shaft, the reactor, and the condenser–cooler (CC).

The main quality parameters are the final juice concentration $\left(X_F\right)$ and the specific energy consumption for concentrating 1 kg of product (J, J/kg). The input parameters make six blocks. The first and second blocks account for the heat exchange between the resonator shaft and the surrounding environment. This allows for determining the power N_E that enters the reaction volume. The third block contains the thermophysical properties of the raw material: density (ρ), viscosity (ν), specific heat capacity (c), latent heat of phase transition (r), and thermal diffusivity (a). This block also includes the initial raw material parameters: flow rate (V_R), concentration (X_I), and temperature (t_I). The fourth block takes into account the geometric parameters of the reaction volume. The fifth block reflects the parameters of the refrigeration unit: cooling capacity (Q_C) and the boiling temperature of the refrigerant (t_C). The sixth block includes the parameters of the cold water circulation loop in the condenser–cooler (CC): cold water flow rate (G_W) and its temperature (t). The coordination of (N_E) and (Q_C) determines the value of the steam generation rate (V_{EV}) and the vacuum level (P) in the reactor. The steam flow rate (V_V) equals the flow rate of the hydrolat (Gh). Thus, dynamic equilibrium is maintained within the dehydrator.

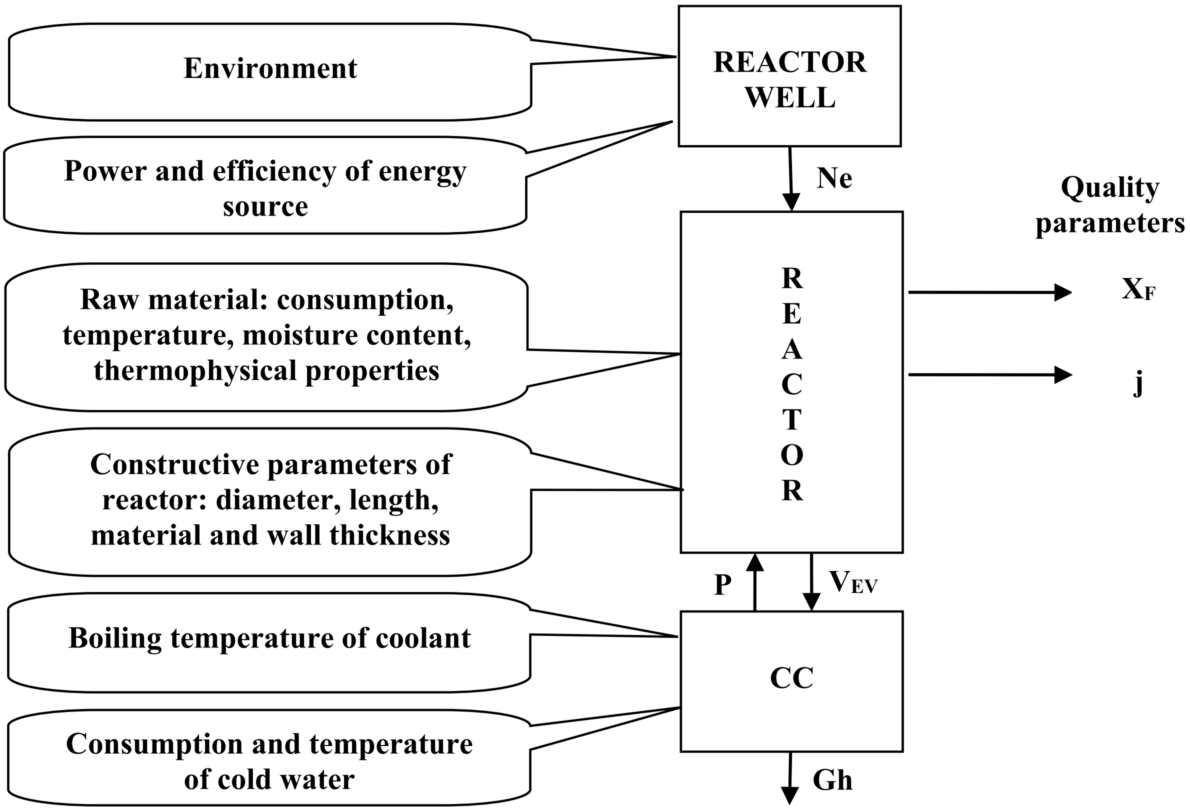

Fig. 3. Parametric model of dehydrator.

Methodology for Dehydrator Calculation

The main performance indicators of the dehydrator are: steam output, final concentration of the finished product, specific energy consumption, nutritional value of the product and hydrolat.

The innovative unit must ensure the following conditions:

1. The steam output should be practically independent of the moisture content in the raw material.
2. The main factor determining the magnitude of the steam output is the type of solvent, its heat energy of the phase transition, and the power of the magnetrons.

The input data for the calculation are:
the volume of juice to be concentrated (V_R); the initial (X_I) and final (X_F) juice concentration values; process duration τ; the electric power of a single energy source/module (N_i); and its efficiency (η).

At the stage when there is no steam output $(V_{EV} = 0)$, the energy is used solely for warming the juice. It is assumed that under conditions of volumetric electromagnetic energy input, the heating process can be represented as the effect of point energy sources evenly distributed throughout the solution (Burdo O.G., *Problems of Regional Energy*, 2017). Taking these assumptions into account, the classical energy equation takes the following form:

$$\frac{\partial t_1}{\partial \tau} = a_1 \nabla^2 t_1 + \frac{N \cdot \eta}{V_1 \cdot c_1 \cdot \rho_1} \quad (1)$$

The subscript 1 in equation (1) refers to the juice, and ∇^2 is the Laplace operator.

For the second stage — evaporation — the process is characterized by a constant phase transition temperature $(t_u = const)$, and the supplied energy $(N\eta\tau)$ is used to increase the internal energy as the heat capacity changes.

The volume of moisture in the juice that needs to be removed (V_{EV}), i.e., the volume of secondary steam, is determined from the material balance of the reactor:

$$\left.\begin{aligned} V_F + V_{EV} &= V_R \\ V_F \cdot X_F &= V_I \cdot X_I \end{aligned}\right\} \quad (2)$$

From equation (2), the steam volume is found as:

$$V_{EV} = V_R - V_I \cdot \frac{X_I}{X_F} \quad (3)$$

The next task in the design process is to determine the energy characteristics of the dehydrator and the number of energy sources — magnetrons (see Fig. 4).

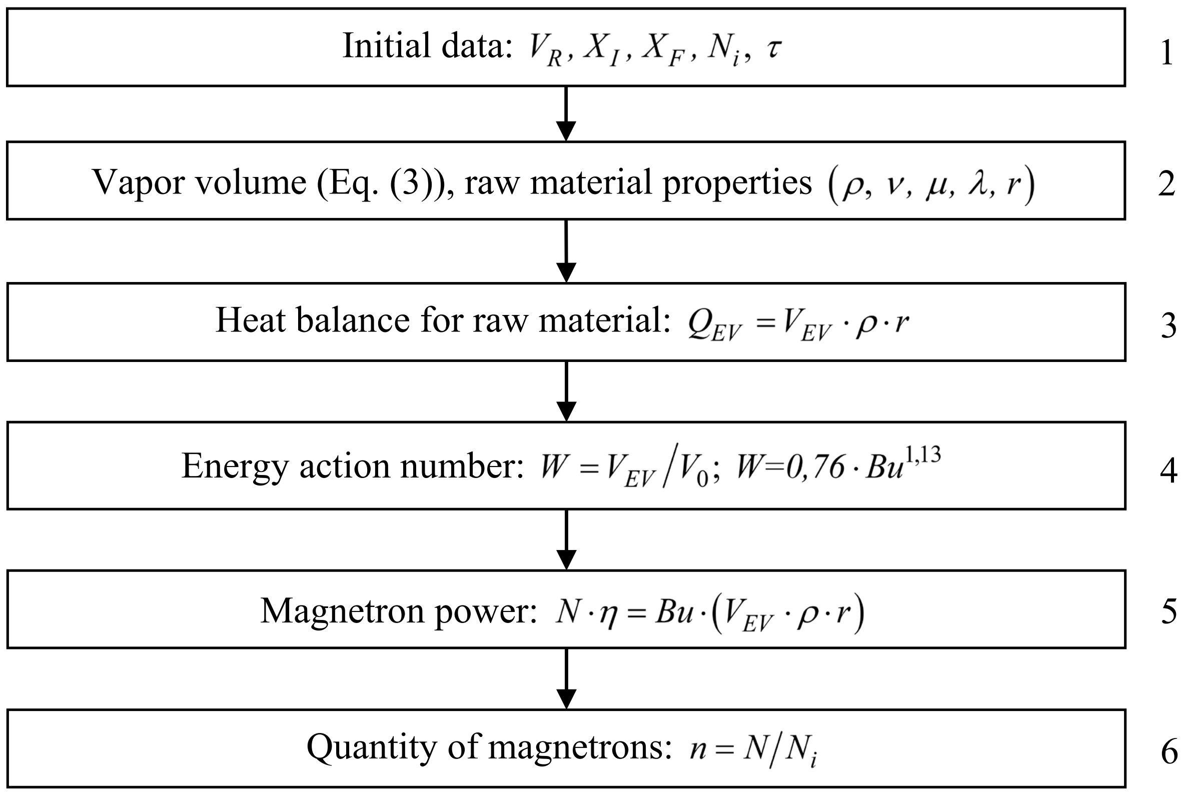

Fig. 4. Algorithm of dehydrator energy characteristics calculation.

The presented algorithm (Fig. 4) does not require cumbersome iterative calculation methods and can be used both for the design of dehydrators and for their optimization.

Energy Efficiency of Microwave Dehydrators

Dry concentrates from solutions in traditional technologies are obtained through sequential dehydration of raw materials in evaporators and spray dryers. The greater the share of spray drying, the higher the total energy consumption. The advantage of microwave dehydrators lies in their ability to replace energy-intensive drying processes.

The energy comparison of technologies was carried out both by the specific energy consumption coefficient J, and by the required specific fuel consumption d (Burdo O.G., *Regional Energy Issues*, 2020), since innovative technologies involve electromagnetic generators (Tables 1 and 2).

All parameters in Tables 1 and 2 are normalized per 1 kg of finished product. For the calculations (Table 2), the following values are assumed: the efficiency of fuel-to-energy conversion in the "gas–steam" chain is 0.7; in the "gas–drying agent" chain — 0.5; and in the "gas–electricity" chain — 0.32.

Table 1.

Summary of the main energy parameters of the traditional technology.

Parameters	Dimension	Evaporator	Dryer	Total
J	MJ/kg	$Q_{EV}=4,6$	$Q_D=25,16$	$Q_T=29,66$
d	m^3/kg	0,16	1,25	1,76

Table 2.

Summary of the main energy parameters of the innovative project.

Parameters	Dimension	Dehydration	Total
J	MJ/kg	$N_{EV}=11,5$	$N_T=11,5$
d	m^3/kg	0,5	0,5

Two conclusions were drawn from the results of the study:

1. The innovative project requires 3.5 times less energy than the traditional one, and in terms of primary fuel consumption — 2 times less.
2. In traditional technologies, more than 80% of volatile aromatic compounds are lost in the spray dryer. In the innovative technology, drying is eliminated, which ensures the near-complete preservation of flavor and aromatic components.

Dehydrator Design

The main components of the dehydrator are: the resonator chamber, the reaction chamber, the cooling system, pressure control instruments, and the magnetron control systems. The resonator chamber, with a cross-section of 240×240 mm, is made of 1.5 mm thick stainless steel and is 1 meter high.

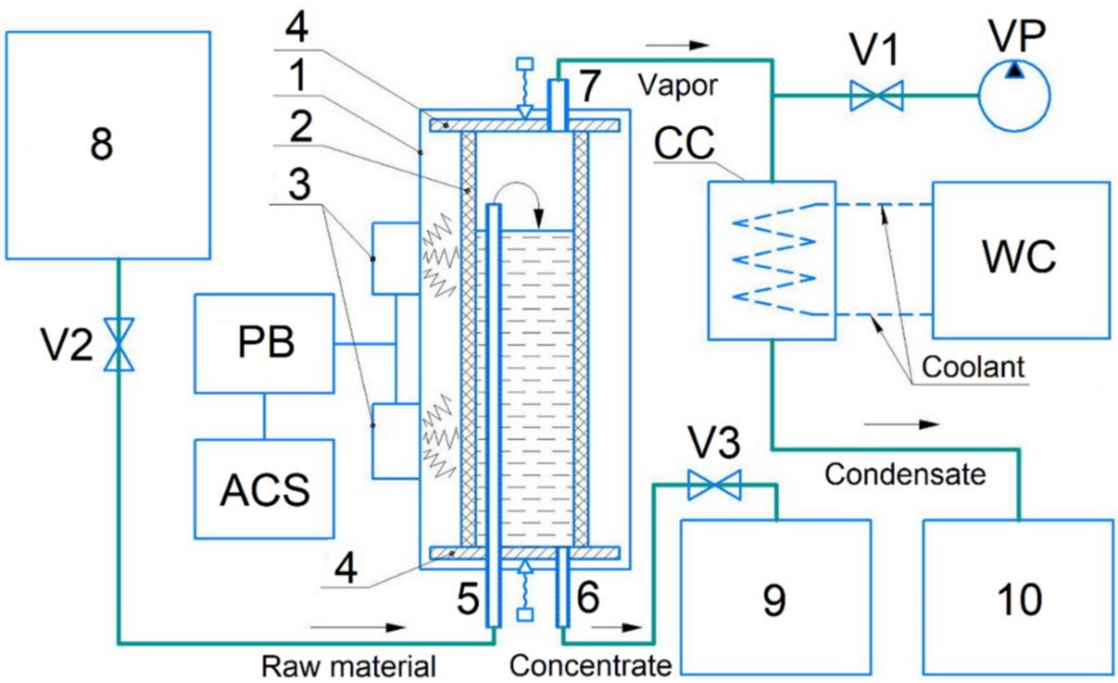

Fig. 5. Scheme of dehydrator.

The working volume of the reactor is divided into vaporization and separation zones. In the center of the resonator chamber (1), the reactor (2) is installed, made of a radio-transparent material (see Fig. 5). The reactor (2) is filled with raw material. Electromagnetic applicators (3) of the microwave range (magnetrons) are mounted on the chamber walls. The upper and lower covers of the chamber are equipped with elements to prevent electromagnetic energy leakage beyond the chamber. Sealing of the reactor is ensured by special upper and lower flanges (4), which are equipped with fittings for raw material input (5), concentrate output (6), and secondary vapor removal (7). The raw material is supplied from a storage tank (8).

The secondary vapor from the reactor (2) flows through channel (6) into the condenser—cooler (CC), where cold water from the water chiller (WC) circulates. The WC is equipped with a compressor–condenser refrigeration unit. The system pressure is maintained by a vacuum pump (VP). Raw material is fed into the reactor through nozzle (5), and the concentrate is collected in tank (9). A photograph showing the main components of the dehydrator is presented in Figure 3.

1 — automated control system (ACS), 2 — raw material container, 3 — vacuum pump (VP), 4 — resonator shaft, 5 — power block (PB), 6 — finished product container, 7 — water chiller (WC)

Fig. 6. Photo of dehydrator.

The hydrolat from the condenser–cooler (CC) is collected in tank (10). The power of the applicators is regulated by the power electronics unit (PB) based on commands from the automated control system (ACS). The ACS sets the power of each magnetron and the operation cycle schedule. The current information is displayed on the ACS screen: power levels and flow temperatures. Emergency shutdown of the dehydrator is provided in the following cases: absence of solution circulation, excessive pressure or temperature, or electromagnetic hazard.

The raw material inlet, concentrate outlet, and secondary vapor outlet units have thermal and hydrodynamic characteristics that comply with technological regulations and ensure flow movement without mixing.

Results of Bench Tests of the Microwave Dehydrator

The following objectives were set during the bench tests:

1. To confirm (or refute) the proposed hypotheses.
2. To evaluate the quality of the final product.
3. To determine the level of energy consumption.

The microwave dehydrator was tested in both batch and continuous operation modes. The steam productivity of the dehydrator was determined depending on the following parameters: microwave field power, pressure in the chamber, and type of solvent. Tests were conducted with both liquid solutions and solid phases.

The following were studied as solutions: wine, apple and grape juices, coffee and echinacea extracts, as well as extracts using acetone as a solvent. Pureed Actinidia fruits were studied as the solid phase.

Kinetic dependencies were obtained showing the influence of microwave field power and product type on steam productivity and specific energy consumption.

It was found that throughout the entire concentration range up to 80 °Brix, steam productivity does not depend on the type of raw material and remains constant.

In the case of complex solutions (such as the water–alcohol mixture in wine), steam productivity gradually decreases as alcohol vapors are released. The main influencing parameters are the latent heats of phase transitions.

The operating modes of the dehydrator were optimized based on technological and energy efficiency criteria.

Samples of concentrates after dehydration underwent comprehensive physicochemical analysis.

CONCLUSIONS

Global experience shows that scientific interest in microwave technologies is steadily growing. The novelty of this work lies in the expansion of research objects and the demonstration of the effectiveness of processing plant raw materials in an electromagnetic field. Numerous facts and confirmations of the technological and energy feasibility of applying microwave devices in food and pharmaceutical technologies are emerging. However, examples of industrial use of microwave technologies are absent in the available literature. Therefore, the authors set the task of developing an engineering calculation methodology and creating an experimental prototype of a microwave dehydrator. A synthesis of the research was conducted. The parametric model of the dehydrator takes into account the systemic influence of the resonator chamber, reactor, and cooler condenser on the concentration of the finished product and specific energy consumption. As a result, an algorithm for calculating the energy characteristics of the dehydrator has been proposed. Through comprehensive testing of the experimental dehydrator prototype, the operational parameters have been optimized. A physicochemical analysis of the finished products was conducted. The content of ascorbic acid in dried actinidia berries, the actinidia berry concentrate, and the apple and grape juice concentrates was determined. The highest content of ascorbic acid was found in the actinidia berry concentrate (375 mg). The ascorbic acid content in the apple juice concentrate was 243 mg%, and in the grape juice concentrate, it was 325 mg%, compared to the control samples of freshly squeezed apple and grape juices, where the content was 1.2 mg% and 50 mg%, respectively. The content of vitamin P (bioflavonoids) in dried actinidia berries, the actinidia berry concentrate, and the apple and grape juice concentrates was determined. The highest content of bioflavonoids was found in the actinidia berry concentrate (18.5 mg%). The bioflavonoid content in the apple juice concentrate was 0.84 mg%, which exceeded the control sample (freshly squeezed juice) by 1.2 times, and in the grape juice concentrate, it was 3 times higher. The following modes were justified: the volumetric density of the microwave field was 53 kW/m³, and the pressure in the chamber was 10 kPa. The specific energy consumption during dehydration was 3.6 MJ/kg.

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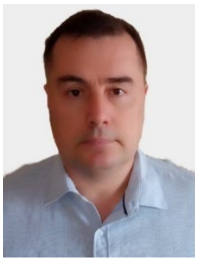

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