ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫ
Satbayev University

ХАБАРЛАРЫ

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН
Satbayev University

N E W S

OF THE ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN
Satbayev University

SERIES
OF GEOLOGY AND TECHNICAL SCIENCES

3 (447)

MAY – JUNE 2021

THE JOURNAL WAS FOUNDED IN 1940

PUBLISHED 6 TIMES A YEAR

ALMATY, NAS RK

NAS RK is pleased to announce that News of NAS RK. Series of geology and technical sciences scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of News of NAS RK. Series of geology and technical sciences in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential content of geology and engineering sciences to our community.

Қазақстан Республикасы Ұлттық ғылым академиясы «ҚР ҰҒА Хабарлары. Геология және техникалық ғылымдар сериясы» ғылыми журналының Web of Science-тің жаңаланған нұсқасы Emerging Sources Citation Index-те индекстелуге қабылданғанын хабарлайды. Бұл индекстелу барысында Clarivate Analytics компаниясы журналды одан әрі the Science Citation Index Expanded, the Social Sciences Citation Index және the Arts & Humanities Citation Index-ке қабылдау мәселесін қарастыруда. Webof Science зерттеушілер, авторлар, баспашылар мен мекемелерге контент тереңдігі мен сапасын ұсынады. ҚР ҰҒА Хабарлары. Геология және техникалық ғылымдар сериясы Emerging Sources Citation Index-ке енуі біздің қоғамдастық үшін ең өзекті және беделді геология және техникалық ғылымдар бойынша контентке адалдығымызды білдіреді.

НАН РК сообщает, что научный журнал «Известия НАН РК. Серия геологии и технических наук» был принят для индексирования в Emerging Sources Citation Index, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Известия НАН РК. Серия геологии и технических наук в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному контенту по геологии и техническим наукам для нашего сообщества.

«ҚР ҰҒА Хабарлары. Геология және техникалық ғылымдар сериясы».
ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)
Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы» РҚБ (Алматы қ.).
Қазақстан Республикасының Ақпарат және қоғамдық даму министрлігінің Ақпарат комитетінде 29.07.2020 ж. берілген **№ KZ39VPY00025420** мерзімдік басылым тіркеуіне қойылу туралы куәлік.
Тақырыптық бағыты: *геология және техникалық ғылымдар бойынша мақалалар жариялау.*
Мерзімділігі: жылына 6 рет.
Тиражы: 211 дана.
Редакцияның мекен-жайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл., тел.: 272-13-19, 272-13-18
http://www.geolog-technical.kz/index.php/en/

Типографияның мекен-жайы: «Аруна» ЖК, Алматы қ., Муратбаева көш., 75.

«Известия НАН РК. Серия геологии и технических наук».
ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)
Собственник: Республиканское общественное объединение «Национальная академия наук Республики Казахстан» (г. Алматы).
Свидетельство о постановке на учет периодического печатного издания в Комитете информации Министерства информации и общественного развития Республики Казахстан **№ KZ39VPY00025420,** выданное 29.07.2020 г.
Тематическая направленность: *публикация статей по геологии и техническим наукам.*
Периодичность: 6 раз в год.
Тираж: 211 экземпляров.
Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, оф. 219, тел.: 272-13-19, 272-13-18
http://www.geolog-technical.kz/index.php/en/

Адрес типографии: ИП «Аруна», г. Алматы, ул. Муратбаева, 75.

News of the National Academy of Sciences of the Republic of Kazakhstan. Series of geology and technology sciences.
ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)
Owner: RPA «National Academy of Sciences of the Republic of Kazakhstan» (Almaty).
The certificate of registration of a periodical printed publication in the Committee of information of the Ministry of Information and Social Development of the Republic of Kazakhstan **No. KZ39VPY00025420,** issued 29.07.2020.
Thematic scope: *publication of papers on geology and technical sciences.*
Periodicity: 6 times a year.
Circulation: 211 copies.
Editorial address: 28, Shevchenko str., of. 219, Almaty, 050010, tel. 272-13-19, 272-13-18, http://www.geolog-technical.kz/index.php/en/

Address of printing house: ST «Aruna», 75, Muratbayev str, Almaty.

NEWS
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF
KAZAKHSTAN **SERIES OF GEOLOGY AND TECHNICAL SCIENCES**
ISSN 2224-5278
Volume 3, Number 447 (2021), 6-11 **https://doi.org/10.32014/2021.2518-170X.54**

ISSN 2224-5227.
UDC 537.523.3:541.13

A.S. Abishova[1], A.A. Bokanova[2], A.I. Kamardin[3], U. M. Mataev[2], T.Y. Meshcheryakova[4]
[1]Almaty Technological University, Department of Textile production technology
[2]Eurasian Technological University, Educational program "Engineering"
[3]National Academy of Sciences of the Republic of Uzbekistan, Scientific and technical center with design bureaus and experimental production
[4]Kazakh-German University, Department of Electric Power Engineering
E-mail: aigul_slanbekovna@mail.ru

DEVELOPMENT OF OPTIMAL CONDITIONS FOR OBTAINING OZONE FOR DECONTAMINATION OF WAREHOUSE AIR

Abstract. The object of the research is the development of optimal conditions for the creation of the ozone elements. He provides decontamination of warehouse air. The aim of the work is the safety of food and non-food products when treated with ozone. This article presents the calculations and development of a mathematical model of the optimal characteristics of innovative technical means for producing ozone. Ozone is designed to neutralize mold fungi, harmful and toxic waste in various industries of the Republic of Kazakhstan. All over the world, both in the near and far abroad, aconsumeruse of the ozone elements for cleaning and decontamination air, water and food products. Ozone has an oxide ability, a powerful bactericidal effect, neutralizes various types of mold fungi and yeast, toxic components, etc. This article discusses the optimal conditions for the production of ozone in ozone devices. The authors develop small-sized ozone devices that will reduce energy and capital costs for the technological lain by 5-10 times compared to foreign analogues. The creation of small-sized ozone devices is achieved due to the production of ozone as a result of a corona discharge from a micro wire whose diameter does not exceed 100 microns. The material for the article on the use of ozone in the agricultural sector, light industry and other industries that ensure the safety of food and non-food products was the research of scientists from near and far abroad, as the work of the authors. The article includes the results of calculations for obtaining the optimal dimensions of corona wires. Depending on the demand for ozone, not only the size, but also the number of ozone cells devices calculated. To vary the size and other parameters of the ozone cells, a mathematical modeling technique was used, which allowed us to obtain the current-voltage characteristics of the ozone cell. To control the mode of the ozonator, a circuit with a control unit is developed.

Key words: ozone, corona discharge, air, room, characteristics, model.

Introduction. All over the world, people are concerned about the microbiological purity of the air in industrial and warehouse premises, such as the textile, woodworking, agricultural sector, etc. In concentrations exceeding the recommended norms, bacteria and mold fungi contribute to the development of many infectious diseases, various mycoses, and provoke allergic reactions [1-3].

The volume of production and consumption of food products by the world's population is growing every year. The Republic of Kazakhstan is one of the countries with a developed system of agro-industrial complex, where there is an annual increase in the number of farm animals and the volume of seed produced [3-5].

As for the production and storage facilities of textile, woodworking and other industries, their processing is of great importance for human health. Issues of labor protection at modern enterprises, including textile ones, are one of the most important problems today, where the main direction is to clean the air from dust and toxic components. Dust is formed during sorting, machining and transportation of various fibrous materials: cotton, flax, hemp, wool, synthetic fibers, etc. [6-9].

Food safety is a public health issue that continues to grow in importance. Governments around the world are stepping up efforts to improve food safety [6]. Therefore, the issues of microbiological cleanliness of the air at various enterprises, processing of products are very relevant.

Novelty. In Kazakhstan, a group of scientists has been engaged in the use of ozone for a long time, which together with colleagues from Uzbekistan conducts research in four areas: air purification of premises of various industries, purification of drinking and waste water, treatment and disinfection of textile materials and food products, as well as storage facilities manufactured goods.

To determine the effect of ozone on the improving safety of industrial premises and warehouses of finished products, the study was carried out using the OAC-1 air ozone device developed by the authors.

Studies have found that a decrease in air pressure in the discharge gap does not affect the process of come out ozone format, on the contrary, it leads to an increase in ozone output at low energy consumption [3-6].

The small dimensions of the corona electrodes, the diameter of which does not exceed 100 microns, will significantly reduce the metal consumption of the device, the capital costs of the plant for processing agricultural products, the costs of the technological line will be 5-10 times lower compared to analogues [7].

One of the important advantages of the ozone device is the absence of air treatment, which significantly reduces the cost of processing products [10]. One of the types of the developed model is an ozone device element for the treatment of atmospheric air and can be used for disinfection and sanitation of air in industrial and office premises, as well as for disinfection of drinking and wastewater. Figure 1 shows a diagram of the model. Ozone device element contains the frame of fluoric, (fluorine) plastic 1 with windows 2 for free access of air, the rod of fluoric plastic 3 coaxially disposed in the housing, the coil of copper wire 4 is wound on the rod, corona wire of tungsten or molybdenum in the form of helix 5, located on top of the first winding 4 and terminals K1, K2, K3 to connect ozone device item with a power source [11-16].

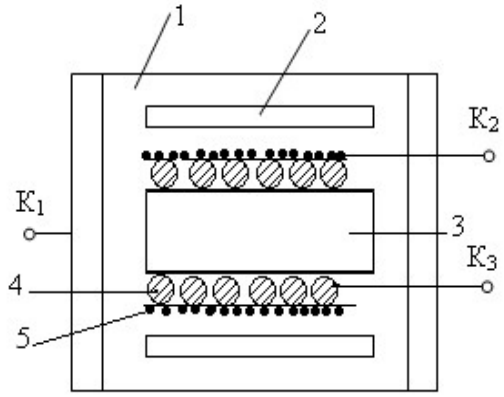

Figure 1-Ozonating element

An alternating voltage of sufficient magnitude is applied to the terminals K2, K3 of the ozone element, after which a corona-barrier discharge occurs in the gaps between the turns of the first winding, leading to the formation of ozone in the atmospheric air [16-18].

Methods. To select the optimal operating conditions of the ozone element, a mathematical model was developed for selecting the diameter of the corona wire, step and inter-turn distance.

The description of the model [14-16]:

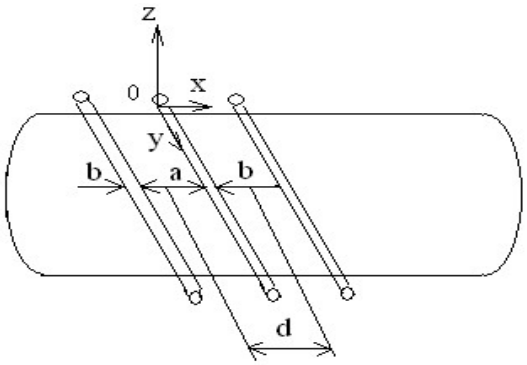

Figure 2 – Section of the ozone cell

1. Analysis of the results of theoretical calculations of the functions Ex = f(z, x, τ, a, b, d); Ez = f (z, x, τ, a, b, d) of the corona-barrier discharge fields, here Ex, Ez, z, x, τ, a, b, d – respectively x and z components of the field strength; components of the radius of the equipotent line, where the potential is sought; the charge per unit length of the charged wire τ; the inter-turn distance a; the diameter of the corona electrode b; the step of the spiral d (figure 2) [14].

2. Planning of a multi-factor element for a preliminary assessment of the mechanical and electrical values of the design of the proposed ozone element on the corona and corona-barrier discharge.

3. Identification and restriction as a result of a multivariate experiment of the range of changes in variables and constants that characterize the working version of the model.

4. Determination of the calculated analytical dependencies taking into account the multivariate experiment and the identified limitations in order to eliminate a number of parameters appearing in the theoretical formula.

5. Finding the analytical dependences of the calculated values through the main varying parameters.

6. Introduction of the found analytical dependences and constants into the theoretical formula, its transformation into an engineering formula, and comparison of the calculation results, error estimation.

$$E_x = 2\tau C + \tau B\left\{e^{-S}\frac{2\pi sinG}{dsinG} + e^{-2S}\frac{4\pi sin2G}{dsin2G}\right\},$$

$$E_z = 2\tau F + \tau B(e^{-S}2\pi ctgG + e^{-2S}4\pi ctg2G), \quad (1)$$

where: $B = \frac{4\pi a\left(1-2ln\frac{a}{b}\right)}{d} C = \frac{X}{Z^2+X^2}; G = \frac{2\pi X}{d}; F = \frac{Z}{Z^2+X^2}; S = \frac{2\pi|Z|}{d}; x = r_0; z = r.$

where: $\tau = \frac{2\pi\varepsilon U_0}{ln\frac{d}{r_0}} = 27.3$ –the charge per unit length of the wire.

Substituting the values E_X, E_Z of the field strength:

$$E_{xz} = \sqrt{E_x^2 + E_z^2} = 163.75 \text{ V}.$$

$$E_x = 2 \cdot 0.071 \cdot \tau + (-17.8)\left(0.04 \cdot \frac{2\pi}{a} + 0.0025 \cdot \frac{4\pi}{a}\right),$$

$$E_z = 2 \cdot 0.37 \cdot \tau + \tau(-17.8)\left\{0.04 \cdot \frac{2\pi}{a} ctg\frac{\pi a}{a} + 0.0025 \cdot \frac{4\pi}{a} ctg\frac{2\pi a}{a}\right\} \quad (2)$$

where: $\tau = \frac{2\pi\varepsilon U_0}{ln\frac{d}{r_0}} = 27.3$ the charge per unit length of the wire.

Substituting the values EX ,EZof the field strength: $E_{xz} = \sqrt{E_x^2 + E_z^2} = 163.75$ V.

Conclusions. As a result of the simulation, the block diagram shown in Figure 3 was compiled [14].

The above theoretical studies of the function E for the design of the OKR type us to establish the intervals of change in the main electrical parameters of the field: for U_0 = -1 kV; x = 0.005 cm; z = 0.026 cm; Ex = -88.57 kV/cm; Ez= -137.7 kV/cm; E = 163.75 kV / cm[14-23].

The digital values of the fixed and calculated values are entered into an intermediate formula for determining the components of the electric field strength, the main varying factors in which are the initial values of the diameter, the inter-turn distance, the spiral step, the radius of the equipotent line, where the potential is sought, the radius of the wire, the potential on the surface of the wire, the charge per unit length of the charged wire(Figure 3) [14].

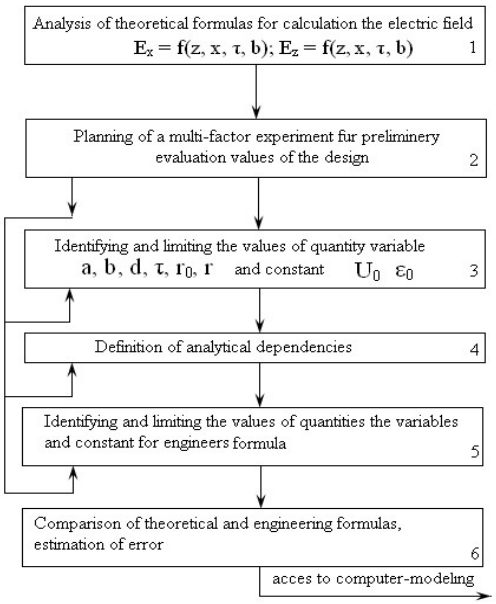

Figure 3 - Structure of the mathematical model

Result. Based on the simulation results, an algorithm and a program for calculating the operating parameters and modes (table).

Current-voltage characteristics of the corona-discharge system depending on the number of tubes

$U_{датр.}$ В		0	20	40	60	80	100	120	150
1 tube	U_1, В	0	1	2,2	3,8	5	5,2	5,80	6,4
	$I_{1к}$, мкА	0	9	20	34	45	47,27	52,72	58,18
2 Tubes	U_2, В	0	0,8	3	4,8	6,40	8	10	12
	$I_{2к}$, мкА	0	7,27	27	43	58	72	90	109
3 Tubes	U_3, В	0	1	3,2	5	7	8,2	10,3	12,5
	$I_{3к}$, мкА	0	9	29	45	63	75	93,6	113
4 Tubes	U_4, В	0	1,3	3,7	5,2	7,7	8,2	10,3	12,6
	$I_{4к}$, мкА	0	11,82	33,64	47,27	70	74,54	93,64	114,54

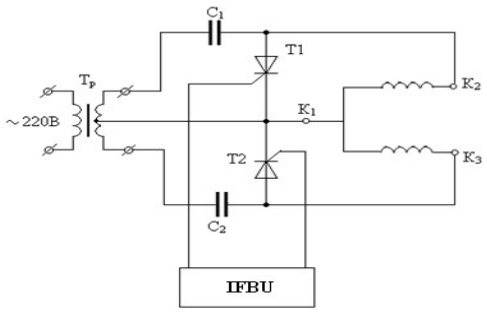

Figure 4 – The scheme of automatic control of the ozone device

The current-voltage characteristics of the ozone device depending on the external conditions and the parameters of the discharge gap are obtained experimentally (figure 5) [16-23].

The scheme of automatic control of the ozonator is shown in Figure 4, where the data obtained as a result of modeling and calculation are set in the pulse-phase control unit of the IFBU, controlled thyristors T1 and T2 are used for voltage conversion. The pulse to the control electrodes of the thyristors is supplied from the control unit and the IFBU.

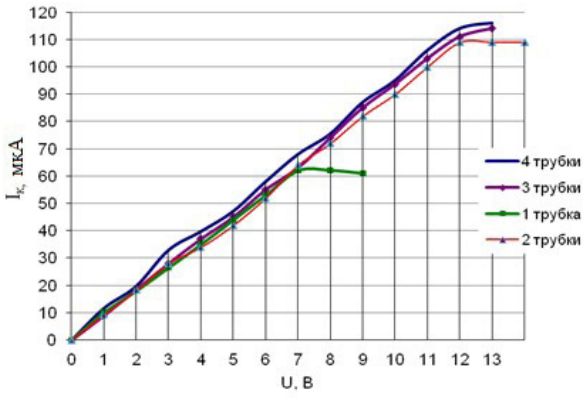

Figure 5- Current-voltage characteristics of corona-discharge devices

Tests of the prototype OAC-1 were performed in the laboratory conditions of the Kazakh Republican Sanitary and Epidemiological Station (KRSES).

А.С. Абишова[1], А.А. Боканова[2], А.И. Камардин[3], У.М. Матаев[2], Т.Ю. Мещерякова[4]
[1]Алматы технологиялық университеті, Тоқыма өндірісінің технологиялық кафедрасы, Алматы, Қазақстан;
[2]Еуразиялық технологиялық университет, «Инжиниринг» білім беру бағдарламасы, Алматы, Қазақстан;
[3]Өзбекістан Республикасының Ғылым академиясы, құрастыру және тәжірибелік өндірістің ғылыми-техникалық орталығы, Ташкент, Өзбекстан;
[4]Қазақстан-неміс университеті, Электр энергетика кафедрасы, Алматы, Қазақстан.
E-mail: aigul_slanbekovna@mail.ru

ҚОЙМАЛАРДЫҢ АУАСЫН ЗАЛАЛСЫЗДАНДЫРУ ҮШІН ОЗОН АЛУДЫҢ ОҢТАЙЛЫ ШАРТТАРЫН ӘЗІРЛЕУ

Аннотация. Зерттеу нысаны-сақтау бөлмелерінің ауасын зарарсыздандыруды қамтамасыз ететін озон элементін құру үшін оңтайлы жағдайларды жасау. Жұмыстың мақсаты-озонмен өңдеу кезінде азық-түлік және азық-түлік емес өнімдердің қауіпсіздігі. Бұл мақалада озон алуға арналған инновациялық техникалық құралдардың оңтайлы сипаттамаларының математикалық моделін есептеу және дамыту келтірілген. Озон Қазақстан Республикасының әр түрлі өнеркәсіп салаларындағы зең саңырауқұлақтарын, зиянды және уытты қалдықтарды бейтараптандыруға арналған. Бүкіл әлемде, жақын және алыс шетелде, озонаторлар ауаны, суды және тамақ өнімдерін тазарту және зарарсыздандыру үшін қолданылады. Озон күшті тотығу қабілетіне ие, күшті бактерицидтік әсерге ие, зең мен ашытқының әртүрлі түрлерін, улы компоненттерді және т. б. бейтараптандырады. Авторлар шетелдік аналогтармен салыстырғанда технологиялық желінің энергетикалық және күрделі шығындарын 5-10 есе азайтуға мүмкіндік беретін шағын озонаторларды жасайды. Шағын өлшемді озонатор құрылғыларын құру диаметрі 100 микроннан аспайтын микро сымнан тәждік разряд нәтижесінде озонды алу нәтижесінде қол жеткізіледі. Озонды аграрлық секторда, жеңіл өнеркәсіпте және азық-түлік және азық-түлік емес өнімдердің қауіпсіздігін қамтамасыз ететін басқа салаларда қолдану туралы мақаланың материалы жақын және алыс шетел ғалымдарының зерттеулері, сондай-ақ авторлардың жұмыстары болды. Мақалада тәж сымдарының оңтайлы мөлшерін алу үшін есептеу нәтижелері келтірілген. Озонның қажеттілігіне байланысты тек мөлшері ғана емес, сонымен қатар озонатор жасушаларының саны да есептеледі. Озон жасушаларының өлшемдері мен басқа параметрлерін өзгерту үшін математикалық модельдеу әдісі қолданылды, бұл озон жасушасының вольт-ампер сипаттамаларын алуға мүмкіндік берді. Озонатор режимін басқару үшін басқару блогы бар схема жасалды.

Түйін сөздер: озон, тәжді разряд, ауа, бөлме, сипаттамалары, моделі.

УДК 537.523.3:541.13

А.С. Абишова[1], А.А. Боканова[2], А.И. Камардин[3], У.М. Матаев[2], Т.Ю. Мещерякова[4]
[1]Алматинский технологический университет, кафедра Технология текстильного производства, Алматы, Казахстан;
[2]Евразийский технологический университет, Образовательная Программа «Инжиниринг», Алматы, Казахстан;
[3]Академия наук Республики Узбекистан, Научно-технический центр с конструкторским и опытным производством, Ташкент, Узбекистан;
[4]Казахстанско-немецкий университет, кафедра Электроэнергетики, Алматы, Казахстан.
E-mail: aigul_slanbekovna@mail.ru

РАЗРАБОТКА ОПТИМАЛЬНЫХ УСЛОВИЙ ПОЛУЧЕНИЯ ОЗОНА ДЛЯ ОБЕЗЗАРАЖИВАНИЯ ВОЗДУХА СКЛАДОВ

Аннотация. Объектом исследования является разработка оптимальных условий для создания озонирующего элемента, обеспечивающего обеззараживание воздуха складских помещений. Целью работы является безопасность продовольственных и непродовольственных продуктов при обработке озоном. В данной статье приведены расчеты и разработка математической моделиоптимальных характеристик инновационных технических средств для получения озона. Озон предназначен для нейтрализации плесневых грибков, вредных и токсичных отходов в различных отраслях промышленности Республики Казахстан. Во всем мире, как в ближнем, так и дальнем зарубежье, для очистки и обеззараживания воздуха, воды и пищевых продуктов используют озонаторы. Озон обладает сильной окислительной способностью, мощным бактерицидным действием, нейтрализует различные

виды плесневых грибков и дрожжей, токсичные компоненты и т.п. В данной статье рассматриваются оптимальные условия для выработки озона в озонирующих устройствах. Авторы разрабатывают малогабаритные озонаторы, которые позволят снизить энергетические и капитальные затраты на технологическую линию в 5-10 раз по сравнению с зарубежными аналогами. Создание озонаторных устройств малых габаритов достигается вследствие получения озона в результате коронного разряда с микропроволоки, диаметр которой не превышает 100 микрон. Материалом для статьи о применении озона в аграрном секторе, легкой промышленности и др. отраслях, обеспечивающего безопасность продовольственных и непродовольственных продуктов явились исследования ученых ближнего и дальнего зарубежья, а также работы авторов. В статью вошли результаты расчетов для получения оптимальных размеров коронирующих проволок. В зависимости от потребности в озоне рассчитаны не только размеры, а также количество озонаторных ячеек. Для вариации размеров и других параметров озонирующих ячеек была применена методика математического моделирования, что позволило получить вольт-амперные характеристики озонирующей ячейки. Для управления режимом озонатора разработана схема с блоком управления.

Ключевые слова: озон, коронный разряд, воздух, помещение, характеристики, модель.

Information about the authors:

Abisheva Aigul Aslanbekovna, Candidate of Technical Sciences, Almaty Technological University, senior lecturer of the Department of Textile Production Technology, aigul_slanbekovna@mail.ru, The original version ofthearticle, https://orcid.org/0000-0002-1405-7783

Bokanova Aliya Abylgazievna, Doctor of Technical Sciences, Eurasian Technological University, Professor of OP "Engineering", Associate Professor, bokanova_a@mail.ru. Developmentoftheoretical, https://orcid.org/0000-0002-3462-5629

Kamardin Alexey Ivanovich, Candidate of Technical Sciences, Academy of Sciences of the Republic of Uzbekistan, Scientific and Technical Center with Design and Pilot Production, kadmon@bk.ru, experimental research, https://orcid.org/0000-0002-7972-9798

Mataev Umirbek Mataevich, Candidate of Technical Sciences, Eurasian Technological University, Associate Professor of OP "Engineering", Associate Professor, u.matayev@etu.edu.kz, researchmethodology, https://orcid.org/0000-0003-0902-478

Meshheryakova Tatyana Yuryevna, Candidate of Technical Sciences, Kazakh-German University, Associate Professor of the Department of Electric Power Engineering, Associate Professor, meshherjakova_ tanja meshherjakova_tanja@rambler.ru, electronics programme, https://orcid.org/0000-0003-1910-8487

REFERENCES

[1] Absametov M.K., Adenova D.K., Nusupova A.B. Assessment of the impact of anthropogenic factors water resources of Kazakhstan. News of National Academy of sciences of the Republic of Kazakhstan. Series of geology and technical sciences ISSN 2224-5278. Vol.1 N 433 (2019). P.248-254. (in Eng.).https://doi.org/1032014/2019.2518-170X.30.

[2] S. Abdreshova, T.Golubeva, S.Konshin, Sh.Bahtaev, B. Aliyarov, V.Tailakov. (2018) A mobile data transfer in energy-efficient intelligent systems for waste water treatment of thermal power plants. IEEE7 of 6 Th International Conference on future internet of Things and Cloud Works hops (FiCW). P.164-169. (in Eng.)

[3] AbdurrahmanovA.A.,Bahtaev S.A., Bokanova A.A., Mataev U. Device for purification of airs of poultry plants. News of National Academy of sciences of the Republic of Kazakhstan. Series of geology and technical sciences ISSN 2224-5278. Vol.4. Number 424 (2017). P.233-236. (inEng.).

[4] Lustgarten T.YU. (2017). Study of working conditionsof a weaver. News of higher educational institutions,Textile industry Technology. Ivanovo, Russia. 5:371.ISSN 0021-3497. P.199. (In Russian).

[5] Talaspayeva A.A., Zhilisbayeva R.O., Tashpulatov S. SH. STUDY of strength characteristics of nonwoven samples. News of higher educational institutions,Textile industry Technology. Ivanovo, Russia. 5:371.ISSN 0021-3497. P.126. (in Russian).

[6] Mshvidobadze T. (2016). Using the computer program for development of the energy system on XII International Scientific and Practical Conference. Real research and development-2016. Sofia, Bulgaria. ISBN 978-966-8736-05-6. P.31. (in Eng.).

[7] http://vet174.ru/ozon-ufo/ozon-i-ego-svoistva

[8] Atalykova A., Sh. Bahtaev, E. Eleukulov, A.Nurlanuly. (2012) Development of a corona-barrier discharge ozonator of International scientific and technical conference POWER, TELECOMMUNICATIONS AND the HIGHER EDUCATION IN MODERN CONDITIONS, dedicated to the 100th anniversary since the birth of academician S.C.Chokin, Almaty, p.64. (in Russian).

[9] Aloyan R.M., Fedoseev V.N., Vinogradova N.V., Zaytseva I.A. (2017) Opportunities and challenges of energy efficient and energysavang technologies in theconstruction and textile industry. Textile industry Technology. Ivanovo, Russia. 5:371.ISSN 0021-3497. P.196. (in Russian).

[10] Lunin V. V., Samoiylovich V.U., Tkachenko S. N., Tkachenko I.S. (2019) Theory and practice of ozone production and application. Russia, Moscow. ISBN: 978-5-19-011046-3. (in Russian). P. 416.

[11] Sh. Bahtaev, N.Kozhaspaev, A. Kodzhabergenova. (2015) Calculation of electric fields of a unipolar corona with a complex configuration of electrodes// Almaty: Vestnik AUEC. – №1. –P.46-51. (in Russian).

[12] Sh. Bahtaev, Bochkareva G.V.. Musapirova G., Avkhadieva F., S. Abdreshova. (2017). A device for measuring the diameter of micro wires. Innovative Patent of Republic of Kazakhstan N 965437. Bull. №2. (in Russian).

[13] Lunin, V. V., Karyagin N.V., Tkachenko S. N., Samoiylovich V.U. (2008) Methods of obtaining ozone and modern designs of ozonators. MAKS Press, Moscow, Russia. - ISBN: 978-5-317-02385-0. 216 p. (In Russian).

[14] Bokanova A. A. (2002). Development of methods and devices for ozone purification and disinfection of water. Abstract dissertation of the Candidate of Technical Sciences. Almaty, Republic of Kazakhstan. UDC: 628.543.3./.9. C. 14. (In Russian).

[15] Toigozhinova A.Zh. Research and development of an automated air ozonation unit. PhD thesis. Almaty, Republic of Kazakhstan. UDC: 681.5:523.3:541.13(043). P. 62. (In Russian).

[16] Bahtaev Sh., Toigozhinova A.Zh., Zhirnova O.V., Wojcik W.T., Suleimenov B.A., Koshimbayev Sh.K. (2017) Modeling of processes in the zone of corona discharge ionization // News of National Academy of sciences of the Republic of Kazakhstan. Series of geology and technical sciences. Almaty, Kazakhstan. 1:421.ISSN 2224-5278. P.197. (in Eng.).

[17] A. Seyitimbetov, G.Sydykova, A. Kodzhabergenova, Sh. Bahtaev, A.Toigozhinova. Device for automatic control and regulation of ozone concentration in a closed volume. Innovative Patent of Republic of Kazakhstan N 30010, Bull. №6, 15/06/2015. (In Russian).

[18] Isembergenov N.T., Taissariyeva K.N., Seidalieva U.O., Danilchenko V.V. Microprocessor control system for solar power station. News of National Academy of sciences of the Republic of Kazakhstan. Series of geology and technical sciences ISSN 2224-5278. Vol.1 N 433 (2019). P.107-111. (in Eng.).https://doi.org/1032014/2019.2518-170X.13.

[19] A.Toigozhinova, Sh.A. Bakhtaev, Sh. Koshimbaev (2015) To Research and Development of system elements of automatic control and regulation of ozone concentration in enclosed space. Research Jr. of applied Sciences 10(12), P. 947-955. ISSN: 1815-932X. (in Eng.)

[20] Paulin O. N. On the functional completeness of the control elements of computational processes. - Odessa: A scientific look into the future. - Vol. 4. - No. 4. - p. 4-8. (in Russian).

[21] BahtaevSh.A., Bochkareva G.V., Musapirova G.D. (2017) Non-contact measurement meters of micro-sizes on coronary discharge. News of National Academy of sciences of the Republic of Kazakhstan. Series of geology and technical sciences ISSN 2224-5278. Vol. 4. Number 424 (2017). P. 208. (inEng.).

[22] Konovalov E.V. Overview of algorithms and positioning system an object. A scientific look into the future. ISSN 2415-7656X. https://doi.org/10.21893/2415-7538-2016-04-4-181. P.30. (in Russian).

[23] Bahtaev Sh.A., Sydykova G.K., Toigozhinova A.Zh., Kodjabergenova A.K. (2017). Corona discharge on microelectrodes. Kyzylorda, Kazakhstan. ISBN 978-601-7015-58-9. P.80. (in Russian).

МАЗМҰНЫ-СОДЕРЖАНИЕ-CONTENTS

Publication Ethics and Publication Malpractice in the journals of the National Academy of Sciences of the Republic of Kazakhstan

For information on Ethics in publishing and Ethical guidelines for journal publication see http://www.elsevier.com/publishingethics and http://www.elsevier.com/journal-authors/ethics.

Submission of an article to the National Academy of Sciences of the Republic of Kazakhstan implies that the described work has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see http://www.elsevier.com/postingpolicy), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. In particular, translations into English of papers already published in another language are not accepted.

No other forms of scientific misconduct are allowed, such as plagiarism, falsification, fraudulent data, incorrect interpretation of other works, incorrect citations, etc. The National Academy of Sciences of the Republic of Kazakhstan follows the Code of Conduct of the Committee on Publication Ethics (COPE), and follows the COPE Flowcharts for Resolving Cases of Suspected Misconduct (http://publicationethics.org/files/u2/New_Code.pdf). To verify originality, your article may be checked by the Cross Check originality detection service http://www.elsevier.com/editors/plagdetect.

The authors are obliged to participate in peer review process and be ready to provide corrections, clarifications, retractions and apologies when needed. All authors of a paper should have significantly contributed to the research.

The reviewers should provide objective judgments and should point out relevant published works which are not yet cited. Reviewed articles should be treated confidentially. The reviewers will be chosen in such a way that there is no conflict of interests with respect to the research, the authors and/or the research funders.

The editors have complete responsibility and authority to reject or accept a paper, and they will only accept a paper when reasonably certain. They will preserve anonymity of reviewers and promote publication of corrections, clarifications, retractions and apologies when needed. The acceptance of a paper automatically implies the copyright transfer to the National Academy of Sciences of the Republic of Kazakhstan.

The Editorial Board of the National Academy of Sciences of the Republic of Kazakhstan will monitor and safeguard publishing ethics.

Правила оформления статьи для публикации в журнале смотреть на сайтах:

www:nauka-nanrk.kz

http://www.geolog-technical.kz/index.php/en/

ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)

Редакторы: *М. С. Ахметова, Р. Ж. Мрзабаева, Д. С. Аленов*
Верстка на компьютере *В.С. Зикирбаева*

Подписано в печать 15.06.2021.
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
4,6 п.л. Тираж 211. Заказ 3.

Национальная академия наук РК
050010, Алматы, ул. Шевченко, 28, т. 272-13-18, 272-13-19