

ISSN 2518-1491 (Online),  
ISSN 2224-5286 (Print)

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ  
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

Д.В. Сокольский атындағы  
«Жанармай, катализ және электрохимия институты» АҚ

# Х А Б А Р Л А Р Ы

---

## ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК  
РЕСПУБЛИКИ КАЗАХСТАН

АО «Институт топлива, катализа и  
электрохимии им. Д.В. Сокольского»

## NEWS

OF THE ACADEMY OF SCIENCES  
OF THE REPUBLIC OF KAZAKHSTAN

JSC «D.V. Sokolsky institute of fuel,  
catalysis and electrochemistry»

**SERIES**  
**CHEMISTRY AND TECHNOLOGY**

**2 (455)**

**APRIL – JUNE 2023**

PUBLISHED SINCE JANUARY 1947

PUBLISHED 4 TIMES A YEAR

**Бас редактор:**

**ЖҰРЫНОВ Мұрат Жұрынұлы**, химия ғылымдарының докторы, профессор, ҚР ҰҒА академигі, Қазақстан Республикасы Ұлттық ғылым академиясының президенті, АҚ «Д.В. Сокольский атындағы отын, катализ және электрохимия институтының» бас директоры (Алматы, Қазақстан) Н = 4

**Редакция алқасы:**

**ӘДЕКЕНОВ Серғазы Мыңжасарұлы** (бас редактордың орынбасары), химия ғылымдарының докторы, профессор, ҚР ҰҒА академигі, «Фитохимия» Халықаралық ғылыми-өндірістік холдингінің директоры (Қарағанды, Қазақстан) Н = 11

**АГАБЕКОВ Владимир Енокович** (бас редактордың орынбасары), химия ғылымдарының докторы, профессор, Беларусь ҰҒА академигі, Жаңа материалдар химиясы институтының құрметті директоры (Минск, Беларусь) Н = 13

**СТРНАД Мирослав**, профессор, Чехия ғылым академиясының Эксперименттік ботаника институтының зертхана меңгерушісі (Оломоуц, Чехия) Н = 66

**БҮРКІТБАЕВ Мұхамбетқали**, химия ғылымдарының докторы, профессор, ҚР ҰҒА академигі, әл-Фараби атындағы ҚазҰУ-дың бірінші проректоры (Алматы, Қазақстан) Н = 11

**ХОХМАНН Джудит**, Сегед университетінің Фармацевтика факультетінің Фармакогнозия кафедрасының меңгерушісі, Жаратылыстану ғылымдарының пәнаралық орталығының директоры (Сегед, Венгрия) Н = 38

**РОСС Самир, PhD докторы**, Миссисипи университетінің Өсімдік өнімдерін ғылыми зерттеу ұлттық орталығы, Фармация мектебінің профессоры (Оксфорд, АҚШ) Н = 35

**ХУТОРЯНСКИЙ Виталий**, философия докторы (PhD, фармацевт), Реддинг университетінің профессоры (Реддинг, Англия) Н = 40

**ТЕЛТАЕВ Бағдат Бұрханбайұлы**, техника ғылымдарының докторы, профессор, ҚР ҰҒА корреспондент-мүшесі, Қазақстан Республикасы Индустрия және инфрақұрылымдық даму министрлігі (Алматы, Қазақстан) Н = 13

**ФАРУК Асана Дар**, Хамдар аль-Маджида Шығыс медицина колледжінің профессоры, Хамдард университетінің Шығыс медицина факультеті (Карачи, Пәкістан) Н = 21

**ФАЗЫЛОВ Серік Драхметұлы**, химия ғылымдарының докторы, профессор, ҚР ҰҒА академигі, Органикалық синтез және көмір химиясы институты директорының ғылыми жұмыстар жөніндегі орынбасары (Қарағанды, Қазақстан) Н = 6

**ЖОРОБЕКОВА Шарипа Жоробекқызы**, химия ғылымдарының докторы, профессор, Қырғызстан ҰҒА академигі, ҚР ҰҒА Химия және химиялық технология институты (Бішкек, Қырғызстан) Н = 4

**ХАЛИКОВ Джурабай Халикович**, химия ғылымдарының докторы, профессор, Тәжікстан ҒА академигі, В.И. Никитин атындағы Химия институты (Душанбе, Тәжікстан) Н = 6

**ФАРЗАЛИЕВ Вагиф Меджидоглы**, химия ғылымдарының докторы, профессор, ҰҒА академигі (Баку, Әзірбайжан) Н = 13

**ГАРЕЛИК Хемда**, философия докторы (PhD, химия), Халықаралық таза және қолданбалы химия одағының Химия және қоршаған орта бөлімінің президенті (Лондон, Англия) Н = 15

**«ҚР ҰҒА Хабарлары. Химия және технология сериясы»**

ISSN 2518-1491 (Online),

ISSN 2224-5286 (Print)

Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы» РҚБ (Алматы қ.). Қазақстан Республикасының Ақпарат және қоғамдық даму министрлігінің Ақпарат комитетінде 29.07.2020 ж. берілген № KZ66VPY00025419 мерзімдік басылым тіркеуіне қойылу туралы куәлік.

Тақырыптық бағыты: *органикалық химия, бейорганикалық химия, катализ, электрохимия және коррозия, фармацевтикалық химия және технологиялар.*

Мерзімділігі: жылына 4 рет.

Тиражы: 300 дана.

Редакцияның мекен-жайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл., тел.: 272-13-19 <http://chemistry-technology.kz/index.php/en/arithiv>

© Қазақстан Республикасының Ұлттық ғылым академиясы, 2023

Редакцияның мекенжайы: 050100, Алматы қ., Қонаев к-сі, 142, «Д.В. Сокольский атындағы отын, катализ және электрохимия институты» АҚ, каб. 310, тел. 291-62-80, факс 291-57-22, e-mail: [orgcat@nursat.kz](mailto:orgcat@nursat.kz)  
 Типографияның мекен-жайы: «Аруна» ЖК, Алматы қ., Мұратбаев көш., 75.

**ЖУРИНОВ Мурат Журинович**, доктор химических наук, профессор, академик НАН РК, президент Национальной академии наук Республики Казахстан, генеральный директор АО «Институт топлива, катализа и электрохимии им. Д.В. Сокольского» (Алматы, Казахстан) Н = 4

**Редакционная коллегия:**

**АДЕКЕНОВ Сергазы Мынжасарович** (заместитель главного редактора), доктор химических наук, профессор, академик НАН РК, директор Международного научно-производственного холдинга «Фитохимия» (Караганда, Казахстан) Н = 11

**АГАБЕКОВ В ладимир Еноквич** (заместитель главного редактора), доктор химических наук, профессор, академик НАН Беларуси, почетный директор Института химии новых материалов (Минск, Беларусь) Н = 13

**СТРНАД Мирослав, профессор**, заведующий лабораторией института Экспериментальной ботаники Чешской академии наук (Оломоуц, Чехия) Н = 66

**БУРКИТБАЕВ Мухамбеткали**, доктор химических наук, профессор, академик НАН РК, Первый проректор КазНУ имени аль-Фараби (Алматы, Казахстан) Н = 11

**ХОХМАНН Джудит**, заведующий кафедрой Фармакогнозии Фармацевтического факультета Университета Сегеда, директор Междисциплинарного центра естественных наук (Сегед, Венгрия) Н = 38

**РОСС Самир**, доктор Ph.D, профессор Школы Фармации национального центра научных исследований растительных продуктов Университета Миссисипи (Оксфорд, США) Н = 35

**ХУТОРЯНСКИЙ Виталий**, доктор философии (Ph.D, фармацевт), профессор Университета Рединга (Рединг, Англия) Н = 40

**ТЕЛЬТАЕВ Багдат Бурханбайулы**, доктор технических наук, профессор, член-корреспондент НАН РК, Министерство Индустрии и инфраструктурного развития Республики Казахстан (Алматы, Казахстан) Н = 13

**ФАРУК Асана Дар**, профессор колледжа Восточной медицины Хамдарда аль-Маджида, факультет Восточной медицины университета Хамдарда (Карачи, Пакистан) Н = 21

**ФАЗЫЛОВ Серик Драхметович**, доктор химических наук, профессор, академик НАН РК, заместитель директора по научной работе Института органического синтеза и углехимии (Караганда, Казахстан) Н = 6

**ЖОРОБЕКОВА Шарипа Жоробековна**, доктор химических наук, профессор, академик НАН Кыргызстана, Институт химии и химической технологии НАН КР (Бишкек, Кыргызстан) Н = 4

**ХАЛИКОВ Джурабай Халикович**, доктор химических наук, профессор, академик АН Таджикистана, Институт химии имени В.И. Никитина АН РТ (Душанбе, Таджикистан) Н = 6

**ФАРЗАЛИЕВ Вагиф Меджид оглы**, доктор химических наук, профессор, академик НАНА (Баку, Азербайджан) Н = 13

**ГАРЕЛИК Хемда**, доктор философии (Ph.D, химия), президент Отдела химии и окружающей среды Международного союза чистой и прикладной химии (Лондон, Англия) Н = 15

**«Известия НАН РК. Серия химии и технологий».**

**ISSN 2518-1491 (Online),**

**ISSN 2224-5286 (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 № **KZ66VPY00025419**, выданное 29.07.2020 г. Тематическая направленность: *органическая химия, неорганическая химия, катализ, электрохимия и коррозия, фармацевтическая химия и технологии.*

Периодичность: 4 раз в год.

Тираж: 300 экземпляров.

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, оф. 219, тел.: 272-13-19 <http://chemistry-technology.kz/index.php/en/arhiv>

© Национальная академия наук Республики Казахстан, 2023

---

Адрес редакции: 050100, г. Алматы, ул. Кунаева, 142, АО «Институт топлива, катализа и электрохимии им. Д.В. Сокольского», каб. 310, тел. 291-62-80, факс 291-57-22, e-mail: [orgcat@nursat.kz](mailto:orgcat@nursat.kz) Адрес типографии: ИП «Аруна», г. Алматы, ул. Муратбаева, 75.

---

**Editor in chief:**

**ZHURINOV Murat Zhurinovich**, doctor of chemistry, professor, academician of NAS RK, president of NAS RK, general director of JSC "Institute of fuel, catalysis and electrochemistry named after D.V. Sokolsky (Almaty, Kazakhstan) Н = 4

**Editorial board:**

**ADEKENOV Sergazy Mynzhasarovich** (deputy editor-in-chief) doctor of chemical sciences, professor, academician of NAS RK, director of the international Scientific and production holding «Phytochemistry» (Karaganda, Kazakhstan) H = 11

**AGABEKOV Vladimir Enokovich** (deputy editor-in-chief), doctor of chemistry, professor, academician of NAS of Belarus, honorary director of the Institute of Chemistry of new materials (Minsk, Belarus) H = 13

**STRNAD Miroslav**, head of the laboratory of the institute of Experimental Botany of the Czech academy of sciences, professor (Olomouc, Czech Republic) H = 66

**BURKITBAYEV Mukhambetkali**, doctor of chemistry, professor, academician of NAS RK, first vice-rector of al-Farabi KazNU (Almaty, Kazakhstan) H = 11

**HOHMANN Judith**, head of the department of pharmacognosy, faculty of Pharmacy, university of Szeged, director of the interdisciplinary center for Life sciences (Szeged, Hungary) H = 38

**ROSS Samir, Ph.D.**, professor, school of Pharmacy, national center for scientific research of Herbal Products, University of Mississippi (Oxford, USA) H = 35

**KHUTORANSKY Vitaly**, Ph.D, pharmacist, professor at the University of Reading (Reading, England) H = 40

**TELTAYEV Bagdat Burkhanbayuly**, doctor of technical sciences, professor, corresponding member of NAS RK, ministry of Industry and infrastructure development of the Republic of Kazakhstan (Almaty, Kazakhstan) H = 13

**PHARUK Asana Dar**, professor at Hamdard al-Majid college of Oriental medicine. faculty of Oriental medicine, Hamdard university (Karachi, Pakistan) H = 21

**FAZYLOV Serik Drakhmetovich**, doctor of chemistry, professor, academician of NAS RK, deputy director for institute of Organic synthesis and coal chemistry (Karaganda, Kazakhstan) H = 6

**ZHOROBEKOVA Sharipa Zhorobekovna**, doctor of chemistry, professor, academician of NAS of Kyrgyzstan, Institute of Chemistry and chemical technology of NAS KR (Bishkek, Kyrgyzstan) H = 4

**KHALIKOV Jurabay Khalikovich**, doctor of chemistry, professor, academician of the academy of sciences of Tajikistan, institute of Chemistry named after V.I. Nikitin AS RT (Tajikistan) H = 6

**FARZALIEV Vagif Medzhidogly**, doctor of chemistry, professor, academician of NAS of Azerbaijan (Azerbaijan) H = 13

**GARELIK Hemda**, PhD in chemistry, president of the department of Chemistry and Environment of the International Union of Pure and Applied Chemistry (London, England) H = 15

News of the National Academy of Sciences of the Republic of Kazakhstan. Series of chemistry and technology.

**ISSN 2518-1491 (Online),**

**ISSN 2224-5286 (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. KZ66VPY00025419**, issued 29.07.2020.

Thematic scope: *organic chemistry, inorganic chemistry, catalysis, electrochemistry and corrosion, pharmaceutical chemistry and technology.*

Periodicity: 4 times a year.

Circulation: 300 copies.

Editorial address: 28, Shevchenko str., of. 219, Almaty, 050010, tel. 272-13-19 <http://chemistry-technology.kz/index.php/en/arhiv>

© National Academy of Sciences of the Republic of Kazakhstan, 2023

---

Editorial address: JSC «D.V. Sokolsky institute of fuel, catalysis and electrochemistry», 142, Kunayev str., of. 310, Almaty, 050100, tel. 291-62-80, fax 291-57-22, e-mail: [orgcat@nursat.kz](mailto:orgcat@nursat.kz) Address of printing house: ST «Aruna», 75, Muratbayev str, Almaty.

NEWS OF THE NATIONAL ACADEMY  
OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN  
SERIES CHEMISTRY AND TECHNOLOGY  
ISSN 2224–5286  
Volume 2. Number 455 (2023), 124–142  
<https://doi.org/10.32014/2023.2518-1491.169>  
UDC 637.5

© **M.K. Kassymova, R.S. Alibekov, Z.I. Kobzhasarova, G.E. Orymbetova\***,  
**K.A. Urazbayeva, 2023**  
M. Auezov South Kazakhstan University, Republic of Kazakhstan.  
E-mail: [orim\\_77@mail.ru](mailto:orim_77@mail.ru)

## HALAL BEEF SAUSAGE PRODUCTS USING MALT

**Kassymova Makhabat Kuandykovna** — candidate of chemical science, professor. M. Auezov South Kazakhstan university. Textile and Food Engineering higher school. Shymkent, Kazakhstan

E-mail: [mahabbat\\_67@mail.ru](mailto:mahabbat_67@mail.ru). ORCID: 0000-0002-4789-7148;

**Alibekov Ravshanbek Sultanbekovich** — candidate of chemical science, professor. M. Auezov South Kazakhstan university. Textile and Food Engineering higher school. Shymkent, Kazakhstan

E-mail: [ralibekov@hotmail.com](mailto:ralibekov@hotmail.com). ORCID: 0000-0002-0723-3101;

**Kobzhasarova ZibaIsakovna** — candidate of technical science, associate professor. M. Auezov South Kazakhstan university. Textile and Food Engineering higher school. Shymkent, Kazakhstan

E-mail: [k.z.i@bk.ru](mailto:k.z.i@bk.ru). ORCID: 0000-0001-5419-7484;

**Orymbetova Gulbagi Emitovna** — candidate of technical science, associate professor. M. Auezov South Kazakhstan university. Textile and Food Engineering higher school. Shymkent, Kazakhstan

E-mail: [orim\\_77@mail.ru](mailto:orim_77@mail.ru). ORCID: 0000-0001-8987-3366;

**Urazbayeva Klara Abdrazakovna** — candidate of chemical science, professor. M. Auezov South Kazakhstan university. Textile and Food Engineering higher school. Shymkent, Kazakhstan

E-mail: [klara\\_abdrzak@mail.ru](mailto:klara_abdrzak@mail.ru). Orcid: 0000-0002-6922-5940.

**Abstract.** The purpose of the study is to develop a technology for beef sausages using malt with improved organoleptic and nutritional properties, as well as to study the content of the mineral composition of the product. To obtain reliable results of the study, the following methods were used: moisture determination method according to GOST 9793–2016 “Meat and meat products. Methods for determination of moisture content”, acid number determination method according to GOST R 55480–2013 Meat and meat products. Method for determination of acid value, inductively coupled plasma mass spectrometry. Experimental production of cooked sausages showed that the use of vegetable raw materials of the enricher in the preparation of sausages makes it possible to rationally use meat raw materials, reduce the cost of production, and improve the nutritional and biological value of products, which affects the organoleptic indicators of products. According to research, the use of malt sausage is optimal, as it participates in creating the basis of a balanced ratio of the main food components.

**Keywords:** sausage, malt, minerals, beef, method, determination, results, GOST, meat

**Financing:** This study was carried out under the the financial support of the research project “Complex waste-free processing of agricultural raw materials of animal and vegetable origin” within the framework of Programme Targeted Funding of the Republic of Kazakhstan No. BR18574252.

**Conflict of interest:** The authors declare that there is no conflict of interest.

© **М.К. Касымова, Р.С. Алибеков, З.И. Кобжасарова,  
Г.Э. Орымбетова\*, К.А. Уразбаева, 2023**

М. Әуезов атындағы Оңтүстік Қазақстан университеті, Қазақстан.

E-mail: orim\_77@mail.ru

## **УЫТ ҚОЛДАНАТЫН ХАЛАЛ ШҰЖЫҚ ӨНІМДЕРІ**

**Касымова Махабат Қуандықовна** — химия ғылымдарының кандидаты, профессор. М. Әуезов атындағы Оңтүстік Қазақстан университеті. Тоқыма және тамақ инженериясы жоғары мектебі. Шымкент, Қазақстан

E-mail: mahabbat\_67@mail.ru. ORCID:0000-0002-4789-7148;

**Алибеков Равшанбек Султанбекович** — химия ғылымдарының кандидаты, профессор. М. Әуезов атындағы Оңтүстік Қазақстан университеті. Тоқыма және тамақ инженериясы жоғары мектебі. Шымкент, Қазақстан

E-mail: ralibekov@hotmail.com. ORCID:0000-0002-0723-3101;

**Кобжасарова Зибә Исаақовна** — техника ғылымдарының кандидаты, доцент. М. Әуезов атындағы Оңтүстік Қазақстан университеті. Тоқыма және тамақ инженериясы жоғары мектебі. Шымкент, Қазақстан

E-mail: k.z.i@bk.ru. ORCID:0000-0001-5419-7484;

**Орымбетова Гулбағи Әмитовна** — техника ғылымдарының кандидаты, доцент. М. Әуезов атындағы Оңтүстік Қазақстан университеті. Тоқыма және тамақ инженериясы жоғары мектебі. Шымкент, Қазақстан

E-mail: orim\_77@mail.ru. ORCID:0000-0001-8987-3366;

**Уразбаева Клара Абдразақовна** — химия ғылымдарының кандидаты, профессор. М. Әуезов атындағы Оңтүстік Қазақстан университеті. Тоқыма және тамақ инженериясы жоғары мектебі. Шымкент, Қазақстан

E-mail: klara\_abdrzak@mail.ru. orcid:0000-0002-6922-5940.

**Аннотация.** Зерттеудің мақсаты органолептикалық және тағамдық қасиеттері жақсартылған уытты пайдаланып сиыр етінен жасалған шұжықтар технологиясын жасау, сонымен қатар өнімнің минералдық құрамын зерттеу болып табылады. Зерттеудің сенімді нәтижелерін алу үшін келесі әдістер қолданылды: Ылғалдылықты анықтау әдісі МЕМСТ 9793–2016 «Ет және ет өнімдері. Ылғалдылықты анықтау әдістері», МЕМСТ R 55480–2013 Ет және ет өнімдері бойынша қышқыл санын анықтау әдісі. Қышқылдық мәнін анықтау әдісі, индуктивті байланысқан плазмалық масс-спектрометрия. Пісірілген шұжықтардың тәжірибелік үлгілері байытқыш ретінде өсімдік шикізатын пайдалану ет шикізатын ұтымды пайдалануға, өнімнің өзіндік құнын төмендетуге, өнімнің тағамдық және биологиялық құндылығын жақсартуға мүмкіндік беретінін

көрсетті, бұл өнімдердің органолептикалық көрсеткіштеріне әсер етеді. Зерттеулерге сәйкес, уытты шұжықтарда пайдалану оңтайлы болып табылады, өйткені ол негізгі тағамдық компоненттердің теңгерімді қатынасының негізін құруға қатысады.

**Түйін сөздер:** шұжық, уыт, минералдық құрам, сиыр еті, әдіс, анықтау, нәтижелер, МЕМСТ, ет

**Қаржыландыру:** Бұл зерттеу «Мал және өсімдік тектес ауыл шаруашылығы шикізатын кешенді қалдықсыз қайта өңдеу» ғылыми-зерттеу жобасы бойынша жүргізілді. Қазақстан Республикасының Нысаналы қаржыландыру бағдарламасы аясында қаржыландырған (Грант № BR10262555).

©**М.К. Касымова, Р.С. Алибеков, З.И. Кобжасарова, Г.Э. Орымбетова, К.А. Уразбаева\***, 2023

Южно Казахстанский университет им. М. Ауэзова, Казахстан.

E-mail: orim\_77@mail.ru

## **ХАЛЯЛНЫЕ КОЛБАСНЫЕ ИЗДЕЛИЯ ИЗ ГОВЯДИНЫ С ИСПОЛЬЗОВАНИЕМ СОЛОДА**

**Касымова Махабат Куандыковна** — кандидат химических наук, профессор. Южно-Казахстанский университет имени М. Ауэзова. Высшая школа Текстильной и пищевой инженерии. Шымкент, Қазақстан

E-mail: mahabbat\_67@mail.ru. ORCID:0000-0002-4789-7148;

**Алибеков Равшанбек Султанбекович** — кандидат химических наук, профессор. Южно-Казахстанский университет имени М. Ауэзова. Высшая школа Текстильной и пищевой инженерии. Шымкент, Қазақстан

E-mail: ralibekov@hotmail.com. ORCID:0000-0002-0723-3101;

**Кобжасарова Зйба Исааковна** — кандидат технических наук, доцент. Южно-Казахстанский университет имени М. Ауэзова. Высшая школа Текстильной и пищевой инженерии. Шымкент, Қазақстан

E-mail: k.z.i@bk.ru. ORCID:0000-0001-5419-7484;

**Орымбетова Гулбағи Эмитовна** — техника ғылымдарының кандидаты, доцент. М. Әуезов атындағы Оңтүстік Қазақстан университеті. Тоқыма және тамақ инженериясы жоғары мектебі. Шымкент, Қазақстан

E-mail: orim\_77@mail.ru. ORCID:0000-0001- 8987-3366;

**Уразбаева Клара Абдразаховна** — кандидат технических наук, доцент. Южно-Казахстанский университет имени М. Ауэзова. Высшая школа Текстильной и пищевой инженерии. Шымкент, Қазақстан

E-mail: klara\_abdrzak@mail.ru. orcid:0000-0002-6922-5940.



**Аннотация.** Цель исследования — разработка технологии колбасных изделий из говядины с использованием солода с улучшенными органолептическими и питательными свойствами, а также изучение содержания минеральных состав продукта. Для получения достоверных результатов исследования использовали следующие методы: метод определения влажности по QOST 9793–2016 “Meatandmeatproducts. Methods for determination of moisture content”, метод определения кислотного числа по QOSTP 55480–2013 Meat and meat products. Methodfordeterminationofacidvalue, масс-спектрометрия с индуктивно-связанной плазмой. Опытная выработка вареных колбасных изделий показала, что использование растительного сырья обогатителя при приготовлении колбасных изделий позволяет рационально использовать мясное сырье, снизить себестоимость продукции, улучшить пищевую и биологическую ценность продукции, что сказывается на органолептических показателях продукции. Согласно исследованиям, использование солода в колбасных изделиях является оптимальным, так как способствует созданию основы для сбалансированного соотношения основных пищевых компонентов.

**Ключевые слова:** колбаса, солод, минеральный состав, говядина, метод, определение, результаты, ГОСТ, мясо

**Финансирование:** Данное исследование выполнялось согласнонаучно-исследовательского проекта «Комплексная безотходная переработка сельскохозяйственного сырья животного и растительного происхождения» в рамках Программы целевого финансирования № BR18574252

## **Introduction**

Currently, sausages and delicacie products are considered to be a large and dynamically developing trade direction of industrial goods in the market of Kazakhstan. They have a long tradition and their market position influences other industrial products. The production of sausages is highly competitive, and small private entrepreneurs and well-known large institutions work intensively in this area. Sausage products are considered an important barometer in the diet of the population. In the conditions of the rapid development of the economy, the consumption of sausage products also increases significantly; and if the financial situation of people worsens, the demand for sausages will decrease accordingly. In the production of domestic sausages, selected types are in great demand among the population. The share of boiled and semi-smoked sausages accounts respectively for 38.6 % and 18,1 % (2015 g.). At the same time, per capita consumption of sausage products is increasing every year.

Consumption of sausage products is subject to seasonal fluctuations. The intensity of use increases before the holidays, as well as during the cold season. In summer, meat products are replaced with vegetables and fruits. To balance such fluctuations, meat production in winter increases by 2–3 times compared to summer.

The range of Kazakhstani sausages is wide. Can sell sausages of dozens of brands from the same industry. At present, according to the consumption of the main types of sausages in Kazakhstan, the share of semi-smoked sausages is approximately 45 %, sausages and wieners 14 %, boiled sausages 35 % and other types of sausages and delicacies 6 % (Analysis of the sausage market in Kazakhstan – 2023) (Figure 1).

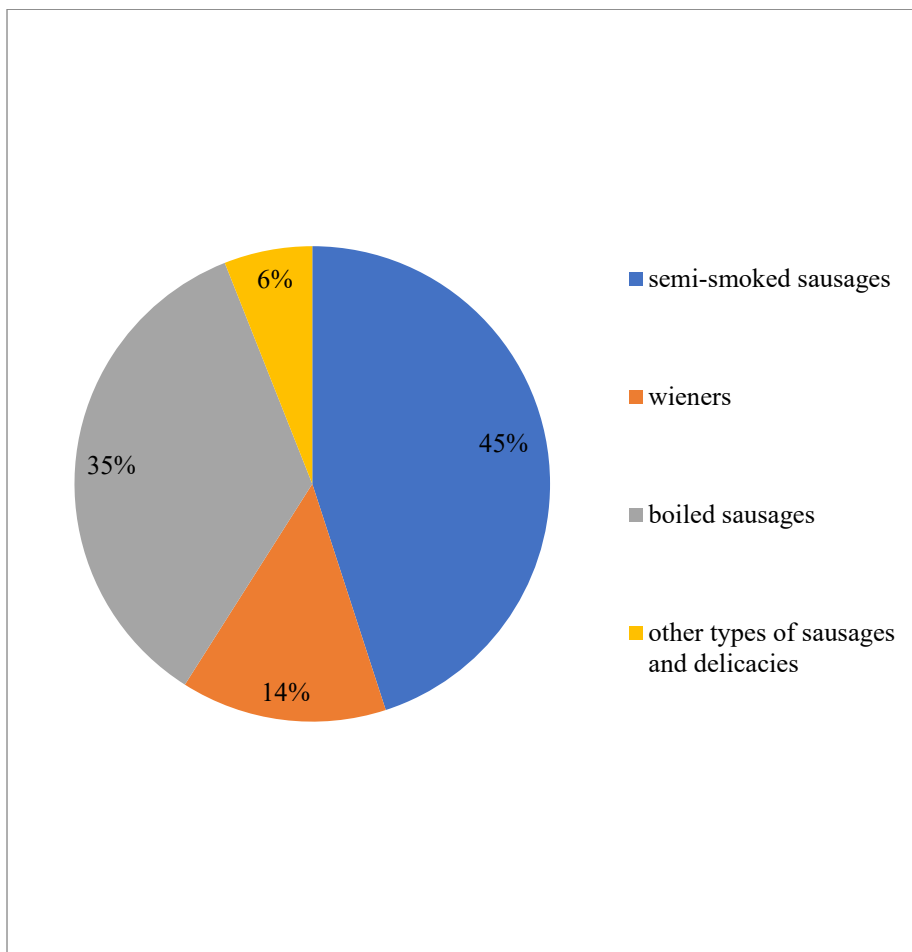


Figure1-Segmentation of consumption of sausages in Kazakhstan

Currently, the production of meat products has increased significantly, including the production of sausages, which are developing in several directions:

1. use of new types of raw materials and food additives;
2. increase the range of products;
3. mastering new equipment and technologies (Zheleuova, 2021; Orymbetova, 2019; Alibekov, 2018).

New types of raw materials are used to stabilize and emulsify minced meat, to replace the meat equivalent and improve the quality of meat (Kassymova, 2020; Bakharev, 2006).

The introduction of non-traditional plant families (pumpkin, sweet pepper, eggplant, tomato, carrot, etc. and products of their processing) into the composition of meat products will undoubtedly make it possible to obtain active

amino acid complexes that provide physiological completeness and high digestibility of products in biological terms (Uzakov, 2008; Beisenbaev, 2014).

The nutritional value of mechanically processed meat is higher than that of conventional meat. Adding 5–25 % mechanically ground meat to minced beef improves its flavor and texture. The bone fat formed during mechanical deboning of beef gives the product a new quality, and the amount of calcium in its content increases (Velichko, 2019; Kobzhasarova, 2021).

There is information about the use of different ingredients in the production of sausages (Slozhenkina, 2015; Bobreneva, 2003; Gordynets, 2004; Khamagaeva, 2006; Dumin, 2002). When developing new types of meat products, one of the criteria for evaluating their recipes is the normalization of the chemical composition of the product from the standpoint of the optimal ratio of protein and fat. The solution of this problem is facilitated by the directed use of protein preparations to improve the functional properties of minced meat. At the same time, the lack of muscle protein in minced meat is compensated by an increase in moisture binding capacity, water holding capacity and fat-retaining capacity, as well as an increase in the stability of sausages during storage, an increase in the volume of production while reducing the consumption of meat raw materials, increasing nutritional value and reducing the cost of the product.

The development of recipes for sausages with a pumpkin protein-carbohydrate complex was based on modern principles of healthy nutrition, based on the selection of certain types of raw materials and their ratios that would provide the required quality characteristics of the product. To confirm the feasibility of using the pumpkin protein-carbohydrate complex, as well as the correctness of the chosen level of their introduction, we conducted studies, including the determination of the general chemical composition and studies on the organoleptic evaluation of finished boiled sausages.

In relation to protein substances, their bioavailability for assimilation by the body, the availability of digestive bonds cleaved by the action of enzymes and bioactivity are distinguished.

The bioavailability of proteins is characterized by their ability to be broken down under the action of digestive enzymes into separate fragments (amino acids and peptides), which can be resorbed by the intestinal wall and assimilated by the body. Bioactivity characterizes the ability of the product to stimulate the processes of internal metabolism, secretory activity.

Thus, the correlation between the biological value of proteins and their amino acid composition can be valid only if the rates of digestion by digestive tract enzymes, the digestibility of components and their bioactivity are sufficiently high.

The bioavailability of protein and the degree of its absorption depends on many factors. In particular, it is due to the nature of the protein and its structure: connective tissue proteins are broken down worse than muscle proteins; native - worse than denatured.

Changes in the physical structure of meat (the degree of dispersion due to grinding) and the biochemical structure of the protein (denaturation), increase the availability of components to the action of digestive enzymes (Baitukenova, 2021; Zinina, 2015; Boreskov, 2000).

Also, premium-segment sausages are practically not produced in Kazakhstan. Demand for elite meat products - natural, “meat-containing”, healthy has grown. For a healthy lifestyle, first of all, the quality of products is important, not their price.

In this regard, the use of methods of mechanical processing of raw materials and new types of food additives are considered relevant.

The purpose of the study is to develop a technology for beef sausages using malt with improved organoleptic and nutritional properties, as well as to study the content of the mineral composition of the product.

To obtain reliable results of the study, the following methods were used: moisture determination method according to GOST 9793–2016 “Meat and meat products. Methods for determination of moisture content”, acid number determination method according to GOST R 55480–2013 Meat and meat products. Method for determination of acid value, inductively coupled plasma mass spectrometry.

### **Materials and methods**

Experimental samples were prepared using the additive with the following mass fraction based on meat: 0,5 %, 0,7 %, 1,0 %, 1,25 and 1,5 %.

The scanning electron microscope is based on the use of a pre-formed thin electron beam (probe) whose position is controlled by electromagnetic fields. This control (scanning) is in many ways similar to the scanning process in television kinescopes. The electron probe sequentially passes over the surface of the test sample (Bykov, 2012).

Under the influence of beam electrons, a number of processes occur that are characteristic of a given material and its structure. These include the scattering of primary electrons, the emission (emission) of secondary electrons, the appearance of electrons that have passed through the object (in the case of thin objects), and the appearance of characteristic radiation. In a number of special cases (luminescent materials, semiconductors), light radiation also occurs.

Registration of electrons leaving the object, as well as other types of radiation (characteristic, light) provides information about the various properties

of micro-sections of the object under study. Accordingly, the display systems and other elements of scanning microscopes differ depending on the type of detected radiation.

Synchronously with the sweep of the electronic probe, an image is built on the computer monitor (the brightness of the pixel on the monitor is proportional to the magnitude of the recorded signal). For example, in the case of a scanning electron microscope in the secondary electron current indication mode, the value of the secondary electron current determines the depth of brightness modulation on a computer monitor. A scanning electron microscope of this type allows you to obtain an increase of 5–1,000,000 times with sufficient image contrast.

The resolution of scanning electron microscopes of this class is determined by the diameter of the electron probe and the sample material and is 10 angstroms.

Organoleptic and physic-chemical parameters of finished products were determined accordingly according to GOST R 52196-2017 (Uvarova, 2007).

### **Results and discussion**

Experimental production of cooked sausages showed that the use of vegetable raw materials of the enricher in the preparation of sausages makes it possible to rationally use meat raw materials, reduce the cost of production, and improve the nutritional and biological value of products, which affects the organoleptic indicators of products.

Sensory evaluation of a food product by its organoleptic properties affects the choice and demand of consumers much more than the chemical composition and nutritional value. Therefore, the results of the effect of the combined extract on the organoleptic characteristics of the studied meat product are of significant value (Zheleuova, 2021).

The results of the assessment of organoleptic indicators of new products are presented in Table 1.

Table1 - Organoleptic indicators of new products

Name of indicator	Characteristics of the organoleptic properties of control and model samples					
	#1 Control sample	Model sample #2- with the addition of 0.5% malt	Model sample # 3 with the addition of 0.7% malt	Model sample #4- with the addition of 1% malt	Model sample #5 with the addition of 1.25 malt	Model sample #6- with the addition of 1.5% malt
Appearance	Long loaf with a clean, dry surface	dry clean	dry clean	The surface is even, clean and dry, no damage to the shell		
Sectional view	Dark pink	Dark rosered	Dark rosered	Uniformly colored and mixed minced meat from pink-red color without gray spots	Uniformly colored and mixed minced meat from pink-red color without gray spots	Uniformly colored and mixed minced meat from pink-red color without gray spots
Consistency	resilient	resilient	resilient	resilient, homogeneous elastic	resilient, homogeneous elastic	resilient, homogeneous elastic
Taste and smell	Peculiar to this type of product, without foreign taste and smell, with the aroma of spices, moderately salty	Peculiar to this type of product, without foreign taste	Peculiar to this type of product, without foreign taste	Peculiar to this product without foreign taste and smell, with the aroma of spices	Peculiar to this product without foreign taste and smell, with the aroma of spices	Peculiar to this product, juicy in taste

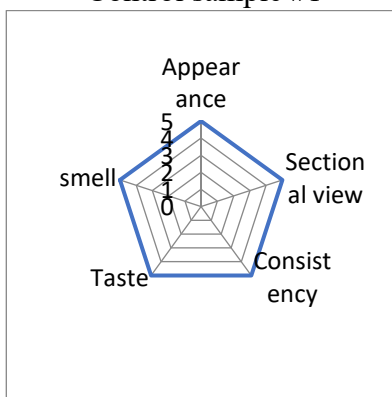
According to organoleptic indicators (table 1, figure 2), samples # 3-5 with an additive content of 1.0–1.5 % showed the best result, i.e. by structures, consistency, texture, as well as by the complex sensation in the oral cavity caused by the taste, smell and texture of the food product.

To obtain accurate and reliable numerical values of product quality indicators established by the organoleptic method, it is necessary to use the method of evaluating food products according to several quality indicators, in which their estimates, expressed in points. The method allows you to set the

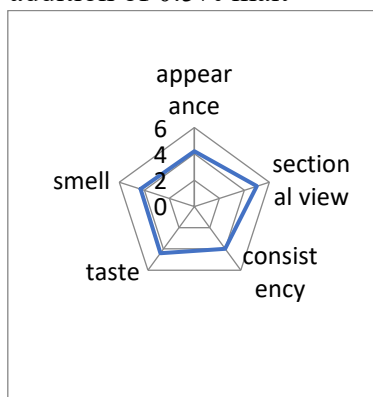
levels of partial (for individual indicators) and general (for a set of indicators) quality.

The results of the sausage evaluation method presented in Figure 2.

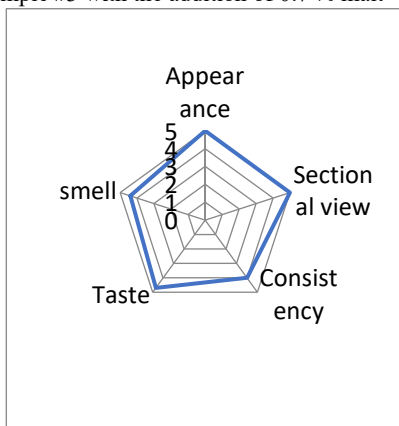
Control sample #1



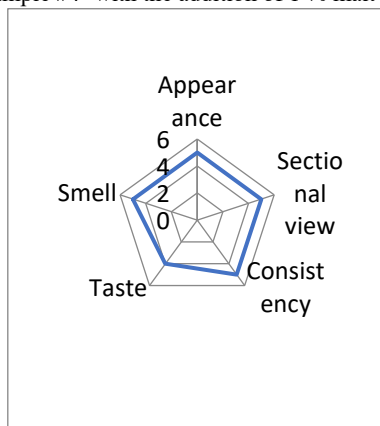
Model sample #2- with the addition of 0.5% malt



Model sample #3 with the addition of 0.7 % malt



Model sample #4- with the addition of 1 % malt



Model sample #5 with the addition of 1.25 malt



Model sample #6- with the addition of 1.5 % malt





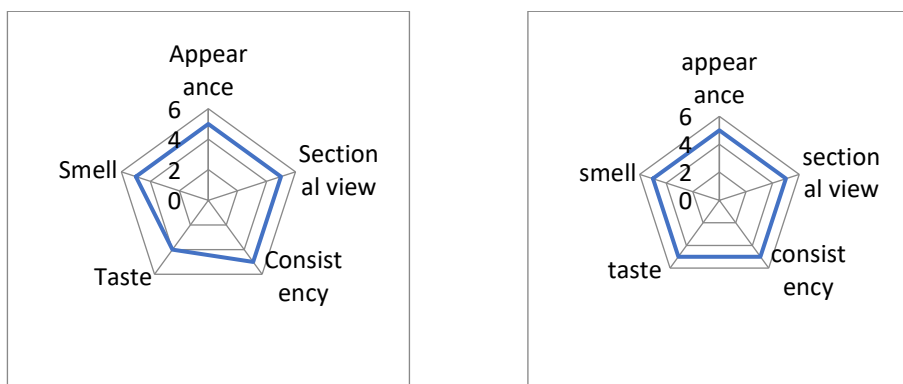


Figure 2 - Organoleptic evaluation

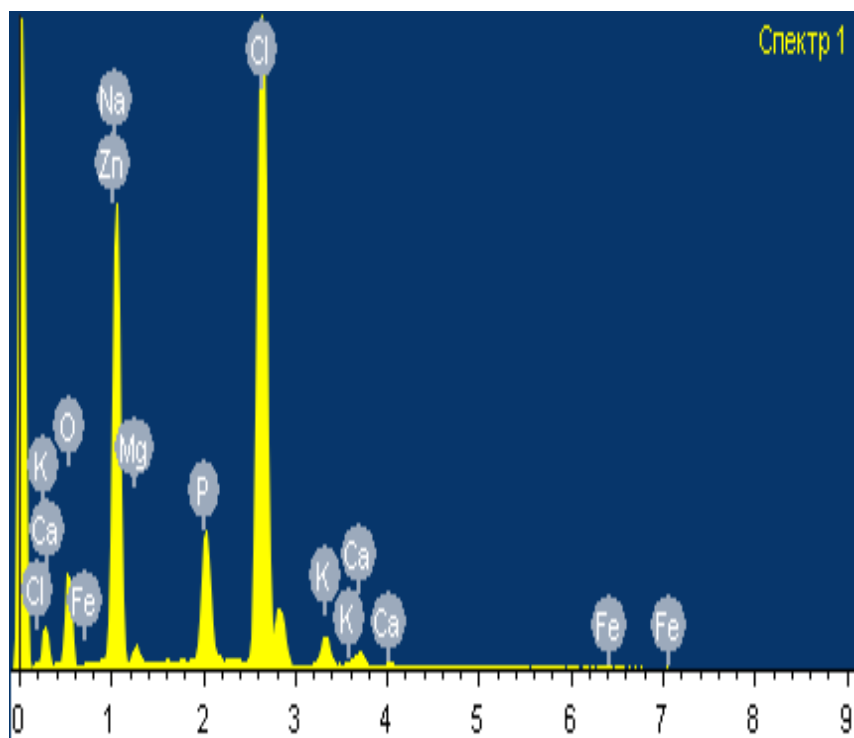
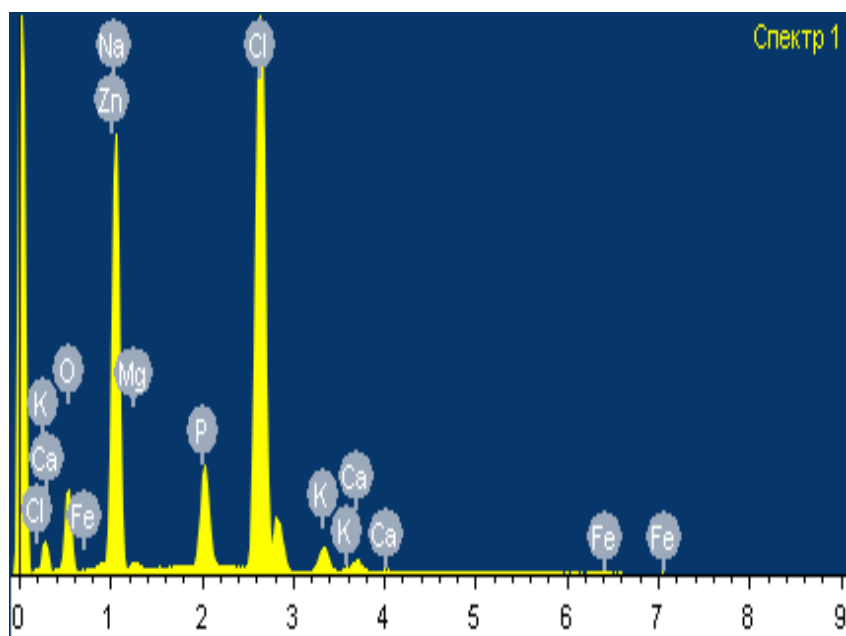
According to the results of the method for evaluating sausage products, which are presented in Figure 2, it can be seen that with the addition of malt 1 and 1.25 % they are inferior only in taste to samples with the addition of 1.5 % malt.

Table 2 shows the physico-chemical indicators of boiled sausage prepared with the addition of malt powder.

Table 2 - Physical and chemical indicators of boiled sausage prepared with the addition of additive powder

Indicators	Control sample	Model samples				
		№1	№2	№3	№4	№5
Mass fraction of ash in terms of dry substance, %	1,0	2,0	2,0	2,1	2,1	2,1
humidity	72	65,5	65	62	62	62
pH	7,0	6,9				
Mass fraction of table salt in terms of dry substance, %	3,1	3,1				
Water-holding capacity, %	85	85	84	84	83	83

The pH value of halal cooked sausages was determined from model samples. As a result, all samples of sausages have a neutral environment and amounted to pH=6.9.



In the control sample, the moisture content of finished sausages was 72 %. Based on the research work, for the model sample № 1, the humidity was determined and is equal to 65.5 %, for the model sample № 2–65.0 %, for the model samples № 3–5, the humidity was 62 %.

The amount of table salt in boiled sausages did not change with an increase in the mass fraction of the addition and amounted to 3.1 %.

The analysis of the obtained results showed that at the rate of nitrite content in boiled sausages not more than 0.005 %, the acceptable level of nitrite content is found in the samples.

The most important factors determining the quality and yield of sausages are the degree of meat grinding and the correctly selected moisture content of minced meat. Boiled sausages have on average acceptable quality with minced meat stability of at least 85 % by weight, water-holding capacity of about 85 % of the total moisture content in minced meat. In this case, the water-holding capacity in the model samples is in the range of 83–85 %.

Finished sausages are stored at a temperature of 0–12°C and air humidity of 75–78 % for no more than 10 days.

The amount of macro- and microelements in the finished product was determined using an electron microscope. An electron microscope is an instrument that allows you to obtain a high-precision image of the surface of a sample. Since the image obtained in an electron microscope is three-dimensional, it is convenient to study the structure of the surface.

X-ray pattern of samples taken with an electron microscope are shown in Figure 3.

Samples	(a)control sample		b (model sample)						
	elements composition, %								
	O	Na	Mg	P	Cl	K	Ca	Fe	Zn
Control sample (a)	24,35	26,49	1,57	7,31	33,21	8,5	1,48	0,16	0,14
Model sample (b)	29,75	22,4	1,74	10,17	26,22	9,09	2,30	0,14	0,36

Figure 3 - X-ray image of samples taken with an electron microscope

According to the chemical results obtained in the ICP-MC mass spectrometer of the samples and as content it was observed that the amount of

macro and microelements in the sausage product enriched with the use of malt increased.

The amount of macro and micronutrients in the studied finished product was studied under an electron microscope. An electron microscope is a tool that allows you to take a high-precision image of the surface of a sample. Because the image obtained in the electron microscope is three-dimensional, it is convenient to study the structure of the surface.

According to research, this type of raw material is optimal and is made on the basis of a balanced ratio of the main food components, which ensures good digestion and digestibility of the stomach.

### **Conclusions**

Experimental production of cooked sausages showed that the use of vegetable raw materials of the enricher in the preparation of sausages makes it possible to rationally use meat raw materials, reduce the cost of production, and improve the nutritional and biological value of products, which affects the organoleptic indicators of products. According to research, the use of malt sausage is optimal, as it participates in creating the basis of a balanced ratio of the main food components.

## REFERENCES

Alibekov R.S., Gabrilyants Z., Alibekova Z. & Norov Z., 2018 — *Alibekov R.S., Gabrilyants Z., Alibekova Z. & Norov Z. Antioxidants of natural origin. In Industrial Technologies And Engineering (ICITE-2018):* Pp. 144–147. (in Eng.)

Analysis of the sausage market in Kazakhstan – 2023. Indicators and forecasts <https://tebiz.ru/assets/pdf/mi/analiz-rynka-kolbasnykh-izdelij-v-kazakhstane> (in Russ.)

Baitukenova Sh.B., Amankyzy G., 2021 — *Baitukenova Sh.B., Amankyzy G. The use of food enzyme preparations in the production of semi-smoked sausages. Materials of the international scientific and theoretical conference "Seifullinskies readings — 17: on "Modern agricultural science: digital transformation", dedicated to the 30th anniversary of the Independence of the Republic of Kazakhstan", Kazakhstan(2), P.49* <https://kazatu.edu.kz/assets/i/science/sf17-pish-promysh-109.pdf>

Bakharev M.V., 2006 — *Bakharev M.V. Evaluation of consumer properties of vegetable powders and their use in the production of boiled sausages. Dis. cand. tech. Sciences: 05. 18. 15 Yekaterinburg.* (in Russ.)

Beisenbaev A.Yu., Urazbaeva K.A., Abishev M.Zh., Beisenbaeva Z.A., 2014 — *Beisenbaev A.Yu., Urazbaeva K.A., Abishev M.Zh., Beisenbaeva Z.A. Study of special additives and dietary fibers in the production of functional dietary sausages // International Journal of Applied and Fundamental Research // International Journal of Applied and Basic Research. 11(2). Pp. 161–165* (in Russ.) <https://elibrary.ru/item.asp?id=22578545>

Bobreneva I.V., 2003 — *Bobreneva I.V. Recommendations for the introduction of dietary supplements into the formulations of functional foods Meatindustry(5): 27.* (In Russ.)

Boreskov V.G., 2000 — *Boreskov V.G. The effect of enzyme preparations on the muscle and connective tissue of beef. Meat industry, (10). Pp. 30–32.* (in Russ.) <https://kazatu.edu.kz/assets/i/science/sf17-pish-promysh-109.pdf>

Bykov Yu.A., Karpukhin S.D., 2012 — *Bykov Yu.A., Karpukhin S.D. Scanning electron microscopy and X-ray spectral microanalysis. Equipment, principle of operation, application: textbook for the course "Modern methods of studying the structure of the material* <http://lab.bmstu.ru/students/MIM/SEM.pdf>

Gordynets S.A., 2004 — *Gordynets S.A. Food additives for the enrichment of meat products [Pischevye dobavki dlia obogascheni amiasnyh produktov] Meatindustry. (11). Pp. 44–46.* (in Russ.)

Zheleuova Z.S., Uzakov Y.M., Shingisov A.U., Alibekov R.S. & Khamitova B.M., 2020 — *Zheleuova Z.S., Uzakov Y.M., Shingisov A.U.,*

*Alibekov R.S. & Khamitova B.M.* Development of halal cooked smoked beef and turkey sausage using a combined plant extracts. *Journal of Food Processing and Preservation*, 45(1), 15028. DOI: 10.1111/jfpp.15028 (in Eng.) <https://doi.org/10.1111/jfpp.15028>

Zinina O.V., Solovieva A.A., Rebezov Ya.M. and others, 2015 — *Zinina O.V., Solovieva A.A., Rebezov Ya.M. and others.* Enzymes in the meat industry of the food industry, on *International Student Scientific Bulletin*, (6). (in Russ.) <https://eduherald.ru/ru/article/view?id=14245>

Kassymova M.K., Orymbetova G.E., Kobzhasarova Z.I., Mamyrbekova A.K., 2020 — *Kassymova M.K., Orymbetova G.E., Kobzhasarova Z.I., Mamyrbekova A.K.* Natural semi-finished stump safety enriched with wheat germ based on horse meat *Shakarim University Herald. Technical Sciences Series*: 3(91). Pp. 273–276. (in Kaz.) [https://tech.vestnik.shakarim.kz/jour/article/view/67/67?locale=en\\_US](https://tech.vestnik.shakarim.kz/jour/article/view/67/67?locale=en_US)

Khamagaeva I.S., Khankhalaeva I.A., Zaigraeva L.I., 2006 — *Khamagaeva I.S., Khankhalaeva I.A., Zaigraeva L.I.* The use of probiotic cultures for the production of sausages. – Ulan-Ude, Russian Federation: ISBN 5-89230-235-0. <https://propionix.ru/f/ispolzovanie-probioticheskikh-kultur-dlya-proizvodstva-kolbasnyh-izdeliy.pdf>

Kobzhasarova Z., Kassymova M., Orymbetova G., Nurseitova Z., Arapbayeva D., 2021 — *Kobzhasarova Z., Kassymova M., Orymbetova G., Nurseitova Z., Arapbayeva D.* Functional meat products/ //VII International Annual Conference In Industrial Technologies and Engineering (ICITE 2021). Shymkent, Kazakhstan: Pp.160–163 (in Eng.) <https://pubs.aip.org/aip/acp/article-abstract/2650/1/030014/2831143>

Dumin M.V., Potapov K.V., Yarmonov A.N., 2002 — *Dumin M.V., Potapov K.V., Yarmonov A.N.* Starting cultures for meat delicacies [Startovye kultury dlia miasnyh delikatesov], *Meat industry*, (5). Pp. 23–24. (in Russ.)

Orymbetova G.E., Abdizhapparova B., Kassymova M.K., 2019 — *Orymbetova G.E., Abdizhapparova B., Kassymova M.K.* Application of HACCP principles in the production of cooked sausage with addition of hawthorn fruit. 2<sup>nd</sup> international conference on food agriculture and animal sciences proceeding book:pp. Pp. 424–428.

Slozhenkina M.I., Gorlov I.F., 2015 — *Slozhenkina M.I., Gorlov I.F.* Development of meat products technology using vegetable protein-carbohydrate complexes and biologically active substances: Volgograd, Russian Federation: ISBN 978–5–9948–1782–7. [http://library.vstu.ru/ebsvstu\\_1/search/view2.php?base](http://library.vstu.ru/ebsvstu_1/search/view2.php?base)

Uzakov Ya.M., Rskeldiev B.A., Butsik V.A., Abzhanova Sh.A., 2008 — *Uzakov Ya.M., Rskeldiev B.A., Butsik V.A., Abzhanova Sh.A.* Status and

development prospects of the meat industry of the Republic of Kazakhstan [Sostoianie i perspektivy razvitiia mäsnoi promyšlenosti Respubliki Kazahstan] // Meat industry. Pp. 43–45. (in Russ.) <https://docviewer.yandex.kz/view/0/?>

Uvarova N.A., Kremenevskaya M.I., Struzhenko I.Yu., 2007 — *Uvarova N.A., Kremenevskaya M.I., Struzhenko I.Yu.* Influence of technological factors on the quality and yield of boiled sausages: Methodical instructions for laboratory work. <https://books.ifmo.ru/file/pdf/1214.pdf>.

Velichko N.A., Mashanov A.I., Rechkina, E.A. Rygalova E.A., 2019 — *Velichko N.A., Mashanov A.I., Rechkina, E.A. Rygalova E.A.* Technology of meat and meat products: textbook [Electronic resource] – Krasnoyarsk, Russian Federation. (in Russ.). <http://www.kgau.ru/new/student/43/content/63.pd>

**МАЗМҰНЫ**

<b>И. Акмалова, В. Меркулов</b> ТҮРЛІ МАЙ ШИКІЗАТТАРЫНЫҢ НЕГІЗІНДЕГІ БЕТТІК-АКТИВДІ ЗАТТАРДЫ АЛУ ӘДІС.....5	5
<b>М.Б. Ахтаева, Г.Е. Азимбаева, Ж.С. Мукагаева</b> ЕКІҮЙЛІ ҚАЛАҚАЙ ( <i>URTICA DIOCA L.</i> ) ҚҰРАМЫНДАҒЫ ПОЛИФЕНОЛДЫ ҚОСЫЛЫСТАРДЫ, ФЛАВОНОИДТАРДЫ, КАРОТИНОИДТАРДЫ ЗЕРТТЕУ.....15	15
<b>К.Б. Бажықова, Т.С. Бекежанова, Қ.Д. Рахимов</b> СЕСКВИТЕРПЕНОИДТАР ҚАТАРЫНАН ХИМИЯЛЫҚ МОДИФИКАЦИЯЛАУ НЕГІЗІНДЕ ВИРУСҚА ҚАРСЫ ББЗ ІЗДЕСТІРУ.....24	24
<b>М.Д. Даулетова, А.К. Үмбетова, Г.Ш. Бурашева, М.И. Чаудхари</b> <i>ATRAPHAXIS</i> ТҰҚЫМДАС ҚАЗАҚСТАНДЫҚ ӨСІМДІК ТҮРЛЕРІНІҢ ҚЫШҚЫЛДЫҚ ҚҰРАМЫН САЛЫСТЫРМАЛЫ ЗЕРТТЕУ.....33	33
<b>М.Ә. Дәуренбек</b> СИНТЕЗ-ГАЗ ӨНДІРІСІНДЕ ФОТОКАТАЛИЗАТОР РЕТІНДЕ ZnIn КҮРДЕЛІ СУЛЬФИДІН ШЕТЕЛДІК ЗЕРТТЕУЛЕР ТУРАЛЫ (жағдайы мен тенденциялары).....43	43
<b>Б.С. Гайсина, Л.К. Оразжанова, Б.Х. Мұсабаева, А.Н. Сабитова, Б.Б. Баяхметова</b> ХИТОЗАН- НАТРИЙ АЛГИНАТЫ НЕГІЗІНДЕГІ БИОҮЙЛЕСІМДІ КРИОҚҰРЫЛЫМДЫ АЛУ ЖӘНЕ ҚАСИЕТТЕРІН ЗЕРТТЕУ.....53	53
<b>Н. Жаникулов, А. Абдуллин, Б. Таймасов, М. Кенжехан</b> МЫРЫШ-ФОСФАТТЫ КОМПОЗИЦИЯЛЫҚ ЦЕМЕНТ АЛУ ҮШІН ФОСФОР ШЛАГЫН ЗЕРТТЕУ.....63	63
<b>М.Ж. Жұрынов, Т.С. Бекежанова, К.Б. Бажықова, К.Д. Рахимов, З.М. Зиятбек</b> ДӘРМЕНЕ ЖУСАНЫ ( <i>ARTEMISIA CINA BERG.</i> ) ӨСІМДІК ШИКІЗАТЫНАН ЭФИР МАЙЛАРЫН БӨЛІП АЛУ ӘДІСТЕРІ ЖӘНЕ ОЛАРДЫ СТАНДАРТТАУ .....75	75
<b>Б. Имангалиева, Б. Торсыкбаева, Г. Рахметова, Т. Нұрдаулетова, Б. Досанова</b> ХИМИЯДАН "ТҮЗДАР ГИДРОЛИЗИ" ТАҚЫРЫБЫН ОҚЫТУДЫҢ ТИІМДІ ТЕХНОЛОГИЯСЫ.....85	85
<b>А.Г. Исмаилова, Г.Ж. Аканова, Д.Х. Камысбаев, С. Исабекова</b> НИТРАТТЫ ОРТАДАН ДИСПРОЗИЙДІ ДЭГФҚ-МЕН ЭКСТРАКЦИЯЛАУ.....98	98
<b>Ж.А. Караев, Ж.У. Кобдикова, Б.Б. Торсыкбаева, Б.С. Имангалиева, Н.Р. Рахым</b> ЖОҒАРҒЫ ОҚУ ОРЫНДАРЫНДА КРИТЕРИАЛДЫ ӘДІЛ БАҒАЛАУ.....111	111
<b>М.К. Касымова, Р.С. Алибеков, З.И. Кобжасарова, Г.Э. Орымбетова, К.А. Уразбаева</b> ҰЫТ ҚОЛДАНАТЫН ХАЛАЛ ШҰЖЫҚ ӨНІМДЕРІ.....124	124



<b>Б.К. Масалимова, Г.Д. Джетписбаева, Е.В. Доқуцич, В.А. Садыков</b> ОРГАНИКАЛЫҚ ТОТЫҚТЫРҒЫШТАР ҚАТЫСЫНДА ПЕРОВСКИТ ҚҰРЫЛЫМДЫ КҮРДЕЛІ ОКСИД $\text{LaCoO}_3$ АЛУ.....	143
<b>Г.Э. Орымбетова, Р.С. Алибеков, Э.А. Габрильянц, К.А. Уразбаева, М.К. Касымова, З.И. Кобжасарова</b> ЕТ-КӨКӨНІС ПАШТЕТТІ ӨНДІРУДЕ ХАССП ЖҮЙЕСІН ҚОЛДАНУ.....	151
<b>С.О. Садикалиева, С.Д. Сатыбалдинова, З.Д. Ершебулов, Е.В. Фокина, К.А. Шораева</b> БИОПРЕПАРАТТАР ӨНДІРУ ҮШІН СУДЫ ХИМИЯЛЫҚ ТАЛДАУ.....	164

## СОДЕРЖАНИЕ

<b>И. Акмалова, В. Меркулов</b> МЕТОД ПОЛУЧЕНИЯ ПОВЕРХНОСТНО-АКТИВНЫХ ВЕЩЕСТВ НА ОСНОВЕ РАЗЛИЧНОГО ЖИРОВОГО СЫРЬЯ.....	5
<b>М.Б. Ахтаева, Г.Е. Азимбаева, Ж.С. Мукатаева</b> ИССЛЕДОВАНИЕ ПОЛИФЕНОЛЬНЫХ СОЕДИНЕНИЙ, ФЛАВОНОИДОВ, КАРОТИНОИДОВ КРАПИВЫ ДВУДОМНОЙ ( <i>URTICA DIOCAL</i> ).....	15
<b>К.Б. Бажыкова, Т.С. Бекежанова, К.Д. Рахимов</b> ПОИСК БАВ ПРОТИВ ВИРУСА ИЗ РЯДА СЕСКВИТЕРПЕНОИДОВ НА ОСНОВЕ ХИМИЧЕСКОЙ МОДИФИКАЦИИ.....	24
<b>М.Д. Даулетова, А.К. Умбетова, Г.Ш. Бурашева, М.И. Чаудхари</b> ОБРАЗОВАНИЕ СРАВНИТЕЛЬНОЕ ИЗУЧЕНИЕ КИСЛОТНОГО СОСТАВА КАЗАХСТАНСКИХ ВИДОВ РАСТЕНИЙ РОДА <i>ATRAPHAXIS</i> .....	33
<b>М.А. Дауренбек</b> О ЗАРУБЕЖНЫХ ИССЛЕДОВАНИЯХ СЛОЖНОГО СУЛЬФИДА ZnIn В КАЧЕСТВЕ ФОТОКАТАЛИЗАТОРОВ В ПРОИЗВОДСТВЕ СИНТЕЗ-ГАЗА (состояние и тенденции).....	43
<b>Б.С. Гайсина, Л.К. Оразжанова, Б.Х. Мұсабаева, А.Н. Сабитова, Б.Б. Баяхметова</b> ПОЛУЧЕНИЕ И ИЗУЧЕНИЕ СВОЙСТВ БИОСОВМЕСТИМОЙ КРИОСТРУКТУРЫ НА ОСНОВЕ ХИТОЗАН-АЛБГИНАТА НАТРИЯ.....	53
<b>Н. Жаникулов, А. Абдуллин, Б. Таймасов, М. Кенжехан</b> ИССЛЕДОВАНИЕ ФОСФОРНОГО ШЛАГА ДЛЯ ПОЛУЧЕНИЯ ЦИНК-ФОСФАТНОГО КОМПОЗИЦИОННОГО ЦЕМЕНТА.....	63
<b>М.Ж. Жұрынов, Т.С. Бекежанова*, К.Б. Бажыкова, К.Д. Рахимов, З.М. Зиятбек</b> СПОСОБЫ ВЫДЕЛЕНИЯ ЭФИРНЫХ МАСЕЛ ИЗ РАСТИТЕЛЬНОГО СЫРЬЯ <i>ARTEMISIA</i> <i>SINA BERG.</i> И ИХ СТАНДАРТИЗАЦИЯ.....	75
<b>Б. Имангалиева, Б. Торсыкбаева, Г. Рахметова, Т. Нурдаулетова, Б. Досанова</b> ЭФФЕКТИВНАЯ ТЕХНОЛОГИЯ ПРЕПОДАВАНИЯ ТЕМЫ "ГИДРОЛИЗ СОЛЕЙ" ПО ХИМИИ.....	85
<b>А.Г. Исмаилова, Г.Ж. Аканова, Д.Х. Камысбаев, С. Исабекова</b> ЭКСТРАКЦИЯ ДИСПРОЗИЯ С Д2ЭГФК ИЗ НИТРАТНОЙ СРЕДЫ.....	98
<b>Ж.А. Караев, Ж.У. Кобдикова, Б.Б. Торсыкбаева, Б.С. Имангалиева, Н.Р. Рахым</b> СПРАВЕДЛИВОЕ КРИТЕРИАЛЬНОЕ ОЦЕНИВАНИЕ В ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ.....	111
<b>М.К. Касымова, Р.С. Алибеков, З.И. Кобжасарова, Г.Э. Орымбетова*, К.А. Уразбаева</b> ХАЛЯЛНЫЕ КОЛБАСНЫЕ ИЗДЕЛИЯ ИЗ ГОВЯДИНЫ С ИСПОЛЬЗОВАНИЕМ СОЛОДА.....	124

<b>Б.К. Масалимова, Г.Д. Джетписбаева, Е.В. Докунич, В.А. Садыков</b> ПОЛУЧЕНИЕ СЛОЖНОГО ОКСИДА СО СТРУКТУРОЙ ПЕРОВСКИТА $LaCOO_3$ В ПРИ СУТСТВИИ ОРГАНИЧЕСКИХ ВОССТАНОВИТЕЛЕЙ.....	143
<b>Г.Э. Орымбетова, Р.С. Алибеков, Э.А. Габрильянц, К.А. Уразбаева, М.К. Касымова, З.И. Кобжасарова</b> ПРИМЕНЕНИЕ ХАССП СИСТЕМЫ В ПРОИЗВОДСТВЕ МЯСОРАСТИТЕЛЬНОГО ПАШТЕТА.....	151
<b>С.О. Садикалиева, С.Д. Сатыбалдинова, З.Д. Ершебулов, Е.В. Фокина, К.А. Шораева</b> ХИМИЧЕСКИЙ АНАЛИЗ ВОДЫ ДЛЯ ПРОИЗВОДСТВА БИОПРЕПАРАТОВ.....	164

## CONTENTS

<b>I. Akmalova, V. Merkulov</b> METHOD OF OBTAINING SURFACTANTS BASED ON VARIOUS FATTY RAW MATERIALS.....	5
<b>M.B. Akhtayeva, G.E. Azimbayeva, J.S. Mukataeva</b> STUDY OF CARATINOID, FLAVONOID, POLYPHENOL COMPOUNDS OF DICOTYLEDONOUS NETTLE ( <i>URTICA DIOCA L.</i> ).....	15
<b>K.B. Bazhykova, T.S. Bekezhanova, K.D. Rakhimov</b> SEARCH FOR BAS AGAINST A VIRUS FROM A NUMBER OF SESQUITERPENOIDS BASED ON CHEMICAL MODIFICATION.....	24
<b>M.D. Dauletova, A.K. Umbetova, G.S. Burasheva, M.I. Chaudhari</b> COMPARATIVE STUDY OF THE ACID COMPOSITION OF KAZAKH PLANT SPECIES OF THE GENUS <i>ATRAPHAXIS</i> .....	33
<b>M.A. Daurenbek</b> ABOUT FOREIGN STUDIES OF ZnIn COMPOUND SULFIDE AS PHOTOCATALYSTS IN THE SYNTHESIS GAS PRODUCTION (status and tendencies).....	43
<b>B.S. Gaisina, L.K. Orazzhanova, B.H. Musabayeva, A.N. Sabitova, B.B. Bayakhmetova</b> OBTAINING AND STUDYING THE PROPERTIES OF A BIOCOMPATIBLE CRYOSTRUCTURE BASED ON CHITOSAN-SODIUM ALGINATE.....	53
<b>N. Zhanikulov, A. Abdullin, B. Taimasov, M. Kenzhehan</b> INVESTIGATION OF PHOSPHORIC SLAG FOR OBTAINING OF ZINC-PHOSPHATE COMPOSITE CEMENT.....	63
<b>M.Zh. Zhurinov, T.S. Bekezhanova, K.B. Bazhykova, K.D. Rakhimov, Z.M. Ziyatbek</b> METHODS OF EXTRACTING ESSENTIAL OILS FROM <i>ARTEMISIA CINA</i> BERG. PLANT RAW MATERIALS AND THEIR STANDARDIZATION.....	75
<b>B. Imangaliyeva, B. Torsykbayeva, B. Dossanova, T. Nurdauletova, G. Rakhmetova</b> EFFECTIVE TECHNOLOGY OF TEACHING "SALTS HYDROLYSIS" IN CHEMISTRY.....	85
<b>A.G. Ismailova, G.Zh. Akanova, D.Kh. Kamysbayev, S. Isabekova</b> EXTRACTION OF DYSPROSIUM BY D2EHPA FROM NITRATE MEDIUM.....	98
<b>Zh. Karaev, Zh. Kobdikova, B. Torsykbaeva, B. Imangaliyeva, N. Rakhym</b> FAIR CRITERIA EVALUATION IN HIGHER EDUCATIONAL INSTITUTIONS.....	111
<b>M.K. Kassymova, R.S. Alibekov, Z.I. Kobzhasarova, G.E. Orymbetova, K.A. Urazbayeva</b> HALAL BEEF SAUSAGE PRODUCTS USING MALT.....	124

**B.K. Massalimova, G.D. Jetpisbayeva, E.V. Docuchits, V.A. Sadykov**  
OBTAINING A COMPLEX OXIDE WITH THE PEROVSKITE STRUCTURE  $\text{LaCoO}_3$   
IN THE PRESENCE OF ORGANIC REDUCING AGENTS.....143

**G.E. Orymbetova, R.S. Alibekov, E.A. Gabrilyants, K.A. Urazbayeva, M.K. Kassymova,  
Z.I. Kobzhasarova**  
APPLICATION OF HACCP SYSTEM FOR THE MEAT-PLANT PASTE PRODUCTION.....151

**S.O. Sadikaliyeva, S.D. Satybaldinova, Z.D. Yershebulov, E.V. Fokina, K.A. Shorayeva**  
CHEMICAL ANALYSIS OF WATER USED IN THE PRODUCTION OF  
BIOLOGICAL PRODUCTS.....16

## **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](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.nauka-nanrk.kz)**

**<http://chemistry-technology.kz/index.php/en/arhiv> ISSN 2518-1491 (Online), ISSN 2224-5286 (Print)**

Заместитель директор отдела издания научных журналов НАН РК *Р. Жәліқызы*

Редакторы: *М.С. Ахметова, Д.С. Аленов*

Верстка на компьютере *Г.Д. Жадырановой*

Подписано в печать 05.07.2023.

Формат 60x88<sup>1</sup>/<sub>8</sub>. Бумага офсетная. Печать – ризограф. 11,0 п.л. Тираж 300. Заказ 2.