ISSN 2224-5294

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

Абай атындағы Қазақ ұлттық педагогикалық университетінің

Х А Б А Р Л А Р Ы

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН
Казахский национальный
педагогический университет им. Абая

N E W S

OF THE NATIONAL ACADEMY OF CIENCES
OF THE REPUBLIC OF KAZAKHSTAN
Abay kazakh national
pedagogical university

SERIES
OF SOCIAL AND HUMAN SCIENCES

6 (328)

NOVEMBER – DECEMBER 2019

PUBLISHED SINCE JANUARY 1962

PUBLISHED 6 TIMES A YEAR

ALMATY, NAS RK

«Қазақстан Республикасы Ұлттық ғылым академиясының Хабарлары. Қоғамдық және гуманитарлық ғылымдар сериясы». ISSN 2224-5294

Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы» РҚБ (Алматы қ.)
Қазақстан республикасының Мәдениет пен ақпарат министрлігінің Ақпарат және мұрағат комитетінде 30.04.2010 ж. берілген **№ 10894-Ж** мерзімдік басылым тіркеуіне қойылу туралы куәлік

Мерзімділігі: жылына 6 рет.
Тиражы: 500 дана.

Редакцияның мекенжайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл., 220, тел.: 272-13-19, 272-13-18,
http://soc-human.kz/index.php/en/arhiv

Типографияның мекенжайы: «Аруна» ЖК, Алматы қ., Муратбаева көш., 75.

Известия Национальной академии наук Республики Казахстан. Серия общественных и гумани-тарных наук. ISSN 2224-5294
Собственник: РОО «Национальная академия наук Республики Казахстан» (г. Алматы)
Свидетельство о постановке на учет периодического печатного издания в Комитете информации и архивов Министерства культуры и информации Республики Казахстан **№ 10894-Ж**, выданное 30.04.2010 г.

Периодичность 6 раз в год
Тираж: 500 экземпляров

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, ком. 219, 220, тел. 272-13-19, 272-13-18,
http://soc-human.kz/index.php/en/arhiv

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

News of the National Academy of Sciences of the Republic of Kazakhstan. Series of Social and Humanities.
ISSN 2224-5294
Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty)
The certificate of registration of a periodic printed publication in the Committee of information and archives of the Ministry of culture and information of the Republic of Kazakhstan **N 10894-Ж**, issued 30.04.2010

Periodicity: 6 times a year
Circulation: 500 copies

Editorial address: 28, Shevchenko str., of. 219, 220, Almaty, 050010, tel. 272-13-19, 272-13-18,
http://soc-human.kz/index.php/en/arhiv

Address of printing house: ST "Aruna", 75, Muratbayev str, Almaty

N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF SOCIAL AND HUMAN SCIENCES
ISSN 2224-5294 **https://doi.org/10.32014/2019.2224-5294.227**
Volume 6, Number 328 (2019), 174 – 177

УДК 910:551.351

A.A. Nazhetova, D.Zh. Kalimanova, A.A. Kopasheva, M.I. Berzhanova

Atyrau State University named after H. Dosmukhamedov, Atyrau, Kazakhstan
E-mail: dana80_04@mail.ru, aiko_79_21@mail.ru, Aimgul84@mail.ru, Roza.berzhanova@inbox.ru

CONTENTS OF DIFFERENT FORMS OF NITROGEN, PHOSPHORUS AND SILICON IN THE WATER UNIT OF THE NORTH-EASTERN PART OF THE CASPIAN SEA

Abstract. This article discusses the results of geochemical studies of the north-eastern part of the Caspian Sea and the content of various forms of nitrogen, phosphorus and silicon in the water column of the north-eastern part of the Caspian Sea. The Caspian Sea occupies a special position in the economy of the Caspian littoral states and is of international importance from an environmental point of view in terms of maintaining the planet's biodiversity.

Changes in hydrometeorological conditions, which play a major role in the life of the Caspian Sea, are combined with the impact of economic activity on its ecosystem, one of which is pollution of the marine environment.

Oil production is developing intensively, and exploration and development work is continuing to detect new hydrocarbon deposits. Characteristic features of oil pollution are multiple sources, ingress into almost all environmental components, dispersal over large areas, accumulation in bottom sediments, etc. Soluble and heavy components ─ oil fractions in water masses easily adsorb other toxicants, including toxic metals, and facilitate their migration. They worsen the quality of water, adversely affect the oxygen regime, disrupt the balanced bonds of the surface layers of water with the atmosphere, etc.

Key words: hydrochemical and geochemical indicators, nitrogen, phosphorus, silicon, concentration.

The hydrochemical nature of the Caspian water is associated with its physical features. The distribution of hydrochemical elements fluctuates by season, and many-year fluctuations associated with sea level fluctuations are also observed. The largest oscillation amplitudes of hydrochemical elements are characteristic of the North Caspian, which is due to the influx of river waters that change the salinity of the water and enrich it with nutrients, as well as the presence of chemical elements that quickly regenerate in bottom sediments in shallow areas of the sea.

Nitrogen compounds. In the water area of the structure, the level of various forms of nitrogen was determined - total, organic, ammonium, nitrite and nitrate. The results are shown in table 1.

Table 1 - The content of different forms of nitrogen in the water column of the north-eastern part of the Caspian Sea

Indicator Horizon Spring Autumn	Indicator Horizon Spring Autumn	Indicator Horizon Spring Autumn	Indicator Horizon Spring Autumn
Total Nitrogen Surface 425-1321	Total Nitrogen Surface 425-1321	Total Nitrogen Surface 425-1321	Total Nitrogen Surface 425-1321
775 318-1265	775 318-1265	775 318-1265	775 318-1265
642	642	642	642
Bottom 413-1418	Bottom 413-1418	Bottom 413-1418	Bottom 413-1418
793 317-1329	793 317-1329	793 317-1329	793 317-1329
644	644	644	644
Organic Nitrogen Surface 342-1290	Organic Nitrogen Surface 342-1290	Organic Nitrogen Surface 342-1290	Organic Nitrogen Surface 342-1290
685 238-1189	685 238-1189	685 238-1189	685 238-1189
593	593	593	593
Bottom 327-1335	Bottom 327-1335	Bottom 327-1335	Bottom 327-1335

Total nitrogen. In surface waters in the water area of the structure, the concentration of total nitrogen in the spring ranged from 425 to 1321 with an average value of 775 μg / L, in bottom waters from 413 to 1418 with an average value of 793 μg / L. The concentration of total nitrogen both at the surface and at the bottom gradually decreased as one moved from the northwest to the southeast. The maximum values were recorded in the surface and bottom layers in the northwestern part of the studied water area, the minimum - in the surface and bottom waters of the southern part of the water area. This trend was also observed in the autumn period of observations. It should be noted a slight decrease in the total nitrogen content in the water column from spring to autumn [1].

Organic nitrogen The concentration of organic nitrogen changed in the spring on the surface from 342 to 1290 with an average value of 685 μg / L, at the bottom - from 327 to 1335 with an average of 717 μg / L. By autumn, the content of organic nitrogen, as well as total, in the surface and bottom horizons of the sea decreased by 1.2 times. Across the entire water mass, a gradual decrease in the concentration of organic nitrogen was observed when moving from the northwest to the southeast.

Ammonium Nitrogen. The concentration of ammonia nitrogen in surface waters in the water area of the structure varied from 14 to 95 μg / L (average - 46 μg / L). The content of ammonia nitrogen in bottom waters in the studied water area varied practically within the same range (14-87 μg / L). In autumn, the range of fluctuations in the amount of ammonia nitrogen was much wider compared to spring (at the surface - 5-148, at the bottom 6-82 μg / l).

It should be noted a decrease in its content in water from spring to autumn by 1.8-1.9 times. Exceeding the MPC value (500 μg / l) in the surface and bottom waters of the studied water area during the observation periods from 2001 to 2004 was not recorded [2].

Nitrite nitrogen. The values of the concentration of nitrite nitrogen in the surface and bottom waters in almost the entire part of the water area were below the detection limit of the analysis method used (less than 5.0 μg / l). The exception was local areas in the northwestern and central parts of the structure, where in the surface layer in 2001 and 2002. nitrite nitrogen concentrations were recorded up to 11, bottom - up to 37 μg / l. In the same areas, in the spring of 2003, nitrite nitrogen concentrations increased to 98.7 μg / L (4.9 MAC).

Nitrate nitrogen. The concentration of nitrate nitrogen in surface waters in the surveyed water area varied in the spring from 3 to 136, in the fall from 3 to 115 μg / l. In bottom waters, the content of nitrate nitrogen was slightly lower (4-127 and 4-88 μg / L, respectively). In autumn, a decrease of 1.4 times (surface layer) and 1.3 (bottom layer) times the amount of this form of nitrogen compared with spring. The greatest amount of nitrate nitrogen was usually observed in the western part. No excess of the MPC value of nitrate nitrogen (40 mg / L) was detected in surface and bottom waters in the water area of the structure.

In general, the waters of the North Caspian are characterized by the predominance of organic forms of nitrogen over mineral forms, as can be seen from the above results of a survey of surface and bottom waters.

A comparison of the obtained results with the results of spring studies revealed a decrease in the concentration of total and organic nitrogen in the waters of the structure in autumn. This tendency is also characteristic of ammonia nitrogen. In general, the values of the concentration and the spatial distribution of nitrogen compounds in the considered water area of the Northern Caspian are typical for the studied seasons. It should be noted that the main feature of the spatial distribution of nitrogen compounds in the shallow part of the North Caspian is the increase in their content in the desalinated waters of the estuarine regions in the coastal zone [3].

Table 2 - The content of phosphorus compounds in the surface and bottom waters of the north-eastern part of the Caspian Sea, μg / l

Indicator Horizon Spring Autumn	Indicator Horizon Spring Autumn	Indicator Horizon Spring Autumn	Indicator Horizon Spring Autumn
Total Phosphorus Surface 37-96	Total Phosphorus Surface 37-96	Total Phosphorus Surface 37-96	Total Phosphorus Surface 37-96
57 13-91	57 13-91	57 13-91	57 13-91
44	44	44	44
Bottom 31-87	Bottom 31-87	Bottom 31-87	Bottom 31-87

Phosphorus compounds. The results of determining the content of total and mineral phosphorus in the water area of the structure are presented in Table 2

The concentration of total phosphorus in surface waters in the Northern Caspian in the region of the structure changed in the spring from 37 to 93 μg / L (average - 57 μg / L), in the autumn - from 13 to 91 μg / L (average - 58 μg / L). Fluctuations in the concentration of total phosphorus in bottom waters ranged from 13 to 91 μg / L in spring and from 12 to 89 μg / L in autumn [4].

Both in spring and summer, the highest total phosphorus content in surface and bottom waters was recorded in the western part of the studied water area, the lowest - in the eastern part.

The concentration of phosphate phosphorus in surface and bottom waters in the studied water area was almost everywhere below the detection limit of the analysis method used (less than 5 μg / l).

The maximum concentration of phosphate phosphorus in surface and bottom waters was recorded in the eastern part of the study area.

The excess of the MPC value (200 μg / L) for phosphate phosphorus in surface and bottom waters was not recorded.

In general, the concentrations of phosphorus compounds and the nature of their spatial distribution in the Northern Caspian are typical for the spring flood period and the beginning of the autumn period. Compared to spring observations, the nature of the autumn spatial distribution of phosphorus compounds remained the same, but the concentration of total phosphorus in the autumn slightly decreased within the considered water area [5, 6].

Silicon. The silicon content in the sea is limited mainly by river runoff. The concentration of silicon in the western, central, and eastern parts of the structure was not the same. Typically, the eastern region is more depleted of silicon than the western and central. However, silicon in comparison with other nutrients contains more than is necessary for biological consumption.

The ranges of fluctuations in silicon concentrations in the spring and autumn periods of observations were close. The silicon content in surface waters in the Northern Caspian on the structure varied from 142 to 1570 μg / L, and in bottom waters from 227 to 1590 μg / L (Table 3). Across the entire water mass, a smooth decrease in the concentration of silicon was observed in the direction from north to south [7].

Table 3 - Silicon content in the water column of the north-eastern part of the Caspian Sea, μg / l

Horizon	Spring Autumn			Spring Autumn		
	Min	Max	Average	Min	Max	Average
Surface	145	1570	653	142	1350	595
Bastard	227	1590	667	105	1300	568

Based on the research results, a preliminary conclusion can be made that the natural self-cleaning potential of the Caspian Sea is in a state of some kind of dynamic equilibrium with modern anthropogenic loads. However, this equilibrium can be violated under the influence of an intensive buildup of economic activity both primarily on the Caspian Sea itself and on its coast.

А.А.Нажетова, Д.Ж.Калиманова, А.А.Копашева, М.И.Бержанова

Атырауский государственный университет им.Х.Досмухамедова, Атырау, Казахстан

СОДЕРЖАНИЕ РАЗНЫХ ФОРМ АЗОТА, ФОСФОРА И КРЕМНИЯ В ВОДНОЙ ТОЛЩЕ СЕВЕРО-ВОСТОЧНОЙ ЧАСТИ КАСПИЙСКОГО МОРЯ

Аннотация. В данной статье рассматриваются результаты геохимических исследований северо-восточной части Каспия и содержание разных форм азота, фосфора и кремния в водной толще северо-восточной части каспийского моря. Каспийское море занимает особое положение в экономике прикаспийских государств имеет международное значение с экологической точки зрения, в плане поддержания биоразнообразия планеты.

Изменения гидрометеорологических условий, играющие главную роль в жизни Каспийского моря, сочетаются с воздействием на его экосистему хозяйственной деятельности, одним из видов которой является загрязнение морской среды.

Интенсивно развивается нефтедобыча, и продолжаются разведочно-поисковые работы по обнаружению новых месторождений углеводородного сырья. Характерные черты загрязнения нефтепродуктами ─ множественность источников, попадание почти во все компоненты окружающей среды, рассеяние на больших акваториях, аккумулирование в донных отложениях и т.д. Растворимые и тяжелые компоненты ─ фракции нефти в водных массах легко адсорбируют другие токсиканты, в том числе токсичные металлы, способствуют их миграции. Они ухудшают качество воды, отрицательно влияют на кислородный режим, нарушают сбалансированные связи поверхностных слоев воды с атмосферой и т.д.

Ключевые слова: гидрохимические и геохимические показатели, азот, фосфор, кремний, концентрация.

А.А. Нажетова, Д.Ж. Калиманова, А.А. Копашева, М.И. Бержанова

Х.Досмұхамедов атындағы Атырау мемлекеттік университеті, Атырау, Қазақстан

КАСПИЙ ТЕҢІЗІНІҢ СОЛТҮСТІК-ШЫҒЫС БӨЛІГІНІҢ СУ БІРЛЕСТІГІНДЕГІ АЗОТ, ФОСФОР ЖӘНЕ СИЛИКОННЫҢ ӘРТҮРЛІ ФОРМАЛАРЫНЫҢ МАЗМҰНЫ

Аннотация. Бұл мақалада Каспий теңізінің солтүстік-шығыс бөлігінің геохимиялық зерттеулерінің нәтижелері және Каспий теңізінің солтүстік-шығыс бөлігінің су бағанындағы азот, фосфор және кремнийдің әртүрлі нысандары туралы айтылады. Каспий теңізі Каспий маңы елдерінің экономикасында ерекше орын алады және планетаның биоәртүрлілігін сақтау тұрғысынан экологиялық тұрғыдан халықаралық маңызға ие.

Каспий теңізінің тіршілігінде үлкен рөл атқаратын гидрометеорологиялық жағдайдың өзгеруі экономикалық қызметтің оның экожүйесіне әсер етуімен үйлеседі, оның бірі теңіз ортасының ластануы болып табылады.

Мұнай өндіру қарқынды дамуда, жаңа көмірсутек кен орындарын іздеу және барлау жұмыстары жалғасуда. Мұнайдың ластануының көптеген белгілері қоршаған ортаның барлық компоненттеріне ену, үлкен аудандарға таралуы, түбіндегі шөгінділердің жиналуы және т.б. болып табылады. Су массаларындағы еритін және ауыр компоненттер - мұнай фракциялары басқа улы заттарды, соның ішінде улы металдарды адсорбциялайды және олардың қоныс аударуын жеңілдетеді. Олар судың сапасын нашарлатады, оттегі режиміне теріс әсер етеді, судың үстіңгі қабаттарының атмосферамен теңгерімді байланысын бұзады және т.б.

Түйін сөздер: гидрохимиялық және геохимиялық көрсеткіштер, азот, фосфор, кремний, концентрация.

Information about the author:

Kalimanova Danagul Zhaskairatovna - Ph. D., senior lecturer of the Department "Chemistry and chemical technology", Atyrau state University.H. dosmukhamedova E-mail: dana80_04@mail.ru https://orcid.org/0000-0001-6904-3218

Nazhetova Aikumis Askarovna – master, lecturer of the Department "Chemistry and chemical technology" Atyrau state University im.H. Dosmukhamedov E-mail: aiko_79_21@mail.ru https://orcid.org/0000-0003-1569-6437

Kopasheva Aiymgul Ajtbaevna - master, teacher of the Department of "Biology and agricultural disciplines", Atyrau state University.H. Dosmukhamedov E-mail: Aimgul84@mail.ru https://orcid.org/0000-0002-0629-9985

Berzhanova Magiya Izgalievna - master, senior lecturer of the Department "Biology and agricultural Sciences", Atyrau state University im.H. Dosmukhamedov E-mail: Roza.berzhanova@inbox.ru https://orcid.org/0000-0002-9448-2148

REFERENCES

[1] Kalimanova D.ZH. Avtoreferat dissertacii «Ekologicheskie osobennosti zoobentosa severo-vostochnoj chasti Kaspijskogo morya (zony, predstoyashchej k osvoeniyu neftegazovyh mestorozhdenij Kazahstanskogo sektora)» Astrahan', 2008g.

[2] Rahym T. Avtoreferat dissertacii «Soltүstik-SHyғys Kaspij teңizindegi mұnaj zhәne mұnaj өnimderi қaldyқtaryn anyқtau әdisteri» Atyrau, 2016 zh.

[3] Kenzhegaliev A., Abilgazieva A.A., SHahmanova A.K., Kalimanova D.ZH. Ocenka ekologicheskogo sostoyaniya gidrobiontov severnogo Kaspiya v svyazi s predstoyashchej dobychej nefti // Monografiya Almaty 2008g. 192s. ISBN 9965-405-22-0

[4] Galimova N.ZH., Kalimanova D.ZH. Opredelenie neftyanyh uglevodorodov v donnyh otlozheniyah // XII Mezhdunarodnaya nauchno-prakticheskoj konferenciya «Fundamental'nye i prikladnye problemy polucheniya novyh materialov: issledovaniya, innovacii i tekhnologii» RF g.Astrahan' 24-27 aprelya 2018g. ISBN 978-5-91910-686-9

[5] Kaziev A. Avtoreferat dissertacii «Osobennosti geohimicheskih i gidrohimicheskih pokazatelej severo-vostochnoj chasti Kaspijskogo morya» Atyrau, 2014 zh.

[6] Kalimanova D.ZH., ZHumagalieva D. Vliyanie solenosti na soderzhanie neftyanyh uglevodorodov v vode reki Ural // IH Mezhdunarodnaya nauchno-prakticheskaya konferenciya molodyh uchenyh «Fundamental'nye i prikladnye problemy polucheniya novyh materialov: issledovanie, innovacii i tekhnologii» RF g.Astrahan' 22-24 aprelya 2015g. 59-61str. ISBN 978-5-91910-368-4

[7] Kubasheva ZH. Avtoreferat dissertacii «Issledovanie osobennosti gidrohimicheskih i geohimicheskih pokazatelej severo-vostochnoj chasti kaspijskogo morya (na primere zony neftegazovyh mestorozhdenij kazahstanskogo sektora)» Atyrau, 2018 zh.

[8] Djumabekova A.T., Sabirova R.K., Bizhanov D.T., Bayadilova B.M., Omarkhanova Zh.M. Innovation in the use of fuel and energy resources of the country. REPORTS OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN ISSN 2224-5227 https://doi.org/10.32014/2019.2518-1483.58 Volume 2, Number 324 (2019), 187 – 191.

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 work described 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 originality detection service Cross Check 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 сайте:

www:nauka-nanrk.kz

http://soc-human.kz/index.php/en/arhiv

Редакторы *М.С. Ахметова, Т.А. Апендиев, Д.С. Аленов*
Верстка на компьютере *А.М. Кульгинбаевой*

Подписано в печать 10.12.2019
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
17,3 п.л. Тираж 500. Заказ 6.