

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



«ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫ» РҚБ
«ХАЛЫҚ» ЖҚ

Х А Б А Р Л А Р Ы

ИЗВЕСТИЯ

РОО «НАЦИОНАЛЬНОЙ
АКАДЕМИИ НАУК РЕСПУБЛИКИ
КАЗАХСТАН»
ЧФ «Халық»

N E W S

OF THE ACADEMY OF SCIENCES
OF THE REPUBLIC OF
KAZAKHSTAN
«Halyk» Private Foundation

SERIES
CHEMISTRY AND TECHNOLOGY
1 (458)

JANUARY – MARCH 2024

PUBLISHED SINCE JANUARY 1947

PUBLISHED 4 TIMES A YEAR

ALMATY, NAS RK



ЧФ «ХАЛЫҚ»

В 2016 году для развития и улучшения качества жизни казахстанцев был создан частный Благотворительный фонд «Халык». За годы своей деятельности на реализацию благотворительных проектов в областях образования и науки, социальной защиты, культуры, здравоохранения и спорта, Фонд выделил более 45 миллиардов тенге.

Особое внимание Благотворительный фонд «Халык» уделяет образовательным программам, считая это направление одним из ключевых в своей деятельности. Оказывая поддержку отечественному образованию, Фонд вносит свой посильный вклад в развитие качественного образования в Казахстане. Тем самым способствуя росту числа людей, способных менять жизнь в стране к лучшему – профессионалов в различных сферах, потенциальных лидеров и «великих умов». Одной из значимых инициатив фонда «Халык» в образовательной сфере стал проект *Ozgeris powered by Halyk Fund* – первый в стране бизнес-инкубатор для учащихся 9-11 классов, который помогает развивать необходимые в современном мире предпринимательские навыки. Так, на содействие малому бизнесу школьников было выделено более 200 грантов. Для поддержки талантливых и мотивированных детей Фонд неоднократно выделял гранты на обучение в Международной школе «Мирас» и в Astana IT University, а также помог казахстанским школьникам принять участие в престижном конкурсе «USTEM Robotics» в США. Авторские работы в рамках проекта «Тәлімгер», которому Фонд оказал поддержку, легли в основу учебной программы, учебников и учебно-методических книг по предмету «Основы предпринимательства и бизнеса», преподаваемого в 10-11 классах казахстанских школ и колледжей.

Помимо помощи школьникам, учащимся колледжей и студентам Фонд считает важным внести свой вклад в повышение квалификации педагогов, совершенствование их знаний и навыков, поскольку именно они являются проводниками знаний будущих поколений казахстанцев. При поддержке Фонда «Халык» в южной столице был организован ежегодный городской конкурс педагогов «Almaty Digital Ustaz».

Важной инициативой стал реализуемый проект по обучению основам финансовой грамотности преподавателей из восьми областей Казахстана, что должно оказать существенное влияние на воспитание финансовой грамотности и предпринимательского мышления у нового поколения граждан страны.

Необходимую помощь Фонд «Халык» оказывает и тем, кто особенно остро в ней нуждается. В рамках социальной защиты населения активно проводится

работа по поддержке детей, оставшихся без родителей, детей и взрослых из социально уязвимых слоев населения, людей с ограниченными возможностями, а также обеспечению нуждающихся социальным жильем, строительству социально важных объектов, таких как детские сады, детские площадки и физкультурно-оздоровительные комплексы.

В копилку добрых дел Фонда «Халык» можно добавить оказание помощи детскому спорту, куда относится поддержка в развитии детского футбола и карате в нашей стране. Жизненно важную помощь Благотворительный фонд «Халык» оказал нашим соотечественникам во время недавней пандемии COVID-19. Тогда, в разгар тяжелой борьбы с коронавирусной инфекцией Фонд выделил свыше 11 миллиардов тенге на приобретение необходимого медицинского оборудования и дорогостоящих медицинских препаратов, автомобилей скорой медицинской помощи и средств защиты, адресную материальную помощь социально уязвимым слоям населения и денежные выплаты медицинским работникам.

В 2023 году наряду с другими проектами, нацеленными на повышение благосостояния казахстанских граждан Фонд решил уделить особое внимание науке, поскольку она является частью общественной культуры, а уровень ее развития определяет уровень развития государства.

Поддержка Фондом выпуска журналов Национальной Академии наук Республики Казахстан, которые входят в международные фонды Scopus и WoS и в которых публикуются статьи отечественных ученых, докторантов и магистрантов, а также научных сотрудников высших учебных заведений и научно-исследовательских институтов нашей страны является не менее значимым вкладом Фонда в развитие казахстанского общества.

**С уважением,
Благотворительный Фонд «Халык»!**

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«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/archiv>

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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

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«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/archiv>

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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>

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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

NEWS

OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN

SERIES CHEMISTRY AND TECHNOLOGY

ISSN 2224–5286

Volume 1. Number 458 (2024), 40–53

<https://doi.org/10.32014/2024.2518-1491.206>

УДК 54.378

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FORMATION OF THE BASICS OF ENVIRONMENTAL EDUCATION IN TEACHING CHEMISTRY

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Abstract. Environmental education is one of the most important priorities for the development of the modern school and the education system as a whole. Currently, the environmental education of young people growing up in the conditions of a comprehensive school should be carried out not only through the prism of the main disciplines of the biological cycle, but also through the system of additional environmental education. An important component of environmental education in teaching modern schoolchildren is the development of environmental culture, which can be understood as the ability of each person to use environmental knowledge and skills in practical activities. Environmental education of students should be carried out through various activities, each of which is designed to stimulate the cognitive activity of students. An analysis of the scientific and educational literature, as well as the results of pedagogical research, shows that the formation of students' environmental competence when studying chemistry remains outside the framework of methodological tasks solved in Chemistry Lessons. One of the most important issues today is the development of environmental competence of students in the study of chemistry and the co-formation of environmental education. The need of society for a person with a high ecological culture and the level of insufficient elaboration of this problem in methodological science, the need to develop the readiness

and ability to competently act in problematic environmental conditions, contributing to the formation and development of environmental competence of schoolchildren, and the insufficient development of pedagogical conditions contributed to the course of this research work. This article discusses the most important aspects of the formation of the foundations of environmental education in the study of chemistry, increasing students' interest in chemistry with the inclusion of environmental concepts in each lesson in conducting a daily lesson. The research works are applied in practice in chemistry and tested by pedagogical experiments.

Keywords: chemistry, education, environmental education, teaching methods

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ХИМИЯ ПӘНІН ОҚЫТУДА ЭКОЛОГИЯЛЫҚ БІЛІМ БЕРУ НЕГІЗДЕРІН ҚАЛЫПТАСТЫРУ

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Аннотация. Экологиялық білім қазіргі заманғы мектеп пен жалпы білім беру жүйесін дамытудың маңызды басым бағыттарының бірі болып табылады. Қазіргі уақытта жалпы білім беретін мектеп жағдайында өсіп келе жатқан жастарды экологиялық тәрбиелеу биологиялық циклдің негізгі пәндерінің призмасы арқылы ғана емес, сонымен қатар қосымша экологиялық білім беру жүйесі арқылы да жүзеге асырылуы керек. Қазіргі мектеп оқушыларын оқытуда экологиялық білім берудің маңызды құрамдас бөлігі экологиялық мәдениетті дамыту болып табылады, бұл әр адамның практикалық іс-әрекетте экологиялық білім мен дағдыларды пайдалану қабілеті деп түсінуге болады. Оқушылардың экологиялық тәрбиесі әр түрлі іс-шаралар арқылы жүзеге асырылуы керек, олардың әрқайсысы оқушылардың танымдық белсенділігін ынталандыруға арналған. Ғылыми және оқу әдебиеттерін талдау, сондай-ақ, педагогикалық зерттеулердің нәтижелері химияны оқу кезінде оқушылардың экологиялық құзыреттілігін қалыптастыру химия сабақтарында шешілетін әдістемелік тапсырмалар шеңберінен тыс қалып

отырғанын көрсетеді. Химия пәнін оқу кезінде оқушылардың экологиялық құзыреттілігін дамыту және экологиялық білім беруді қоса қалыптастыру қазіргі күнгі маңызды мәселелердің бірі. Қоғамның экологиялық мәдениеті жоғары адамға қажеттілігі және бұл мәселенің әдіснамалық ғылымда жеткіліксіз өңделу деңгейі, мектеп оқушыларының экологиялық құзыреттілігін қалыптастыру мен дамытуға ықпал ететін проблемалық экологиялық жағдайларда сауатты әрекет етуге дайындығы мен қабілетін дамыту қажеттілігі және педагогикалық жағдайлардың жеткіліксіз дамуы осы зерттеу жұмысының жүруіне ықпал етті. Бұл мақалада химия пәнін оқытуда экологиялық білім беру негіздерін қалыптастырудың маңызды аспектілері, күнделікті сабақты өткізуде әр сабаққа экологиялық ұғымдарды қоса отырып, оқушылардың химия пәніне деген қызығушылығын арттыру қарастырылады. Зерттеу жұмыстары тәжірибеде химия пәнінде қолданылып, педагогикалық эксперименттер арқылы тексеріліп берілген.

Түйін сөздер: химия, білім беру, экологиялық білім, оқыту әдістемесі

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ФОРМИРОВАНИЕ ОСНОВ ЭКОЛОГИЧЕСКОГО ОБРАЗОВАНИЯ ПРИ ИЗУЧЕНИИ ХИМИИ

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Аннотация. Экологическое образование является одним из важнейших приоритетов развития современной школы и системы образования в целом. В настоящее время экологическое воспитание молодежи, растущей в условиях общеобразовательной школы, должно осуществляться не только через призму основных дисциплин биологического цикла, но и через систему дополнительного экологического образования. Важной составляющей экологического образования в обучении современных школьников является развитие экологической культуры, под которой можно понимать способность каждого человека использовать экологические знания и умения в практической деятельности.

Экологическое воспитание учащихся должно осуществляться посредством различных мероприятий, каждое из которых призвано стимулировать познавательную активность. Анализ научной и учебно-методической литературы, а также результатов педагогических исследований показывает, что формирование экологической компетентности учащихся при изучении химии остается за рамками методических задач, решаемых на уроках химии. Одним из важнейших вопросов на сегодняшний день является развитие экологической компетентности учащихся при изучении химии и совместное формирование экологического образования. Потребность общества в человеке с высокой экологической культурой и уровень недостаточной разработанности данной проблемы в методической науке, необходимость формирования готовности и умения грамотно действовать в проблемных экологических условиях, способствующих формированию и развитию экологической компетентности школьников, а также недостаточная разработанность педагогических условий внес свой вклад в ход этой исследовательской работы. В данной статье рассматриваются важнейшие аспекты формирования основ экологического образования при изучении химии, повышения интереса учащихся к химии с включением экологических концепций на каждом уроке при проведении ежедневного урока. Исследовательские работы применяются на практике по химии и проверяются педагогическими экспериментами.

Ключевые слова: химия, образование, экологическое образование, методика обучения

Introduction

In order to deeply understand environmental problems in all their complexity and ensure their sustainable development, it is very difficult to determine their solutions. This requires a new type of education – education for Sustainable Development. The practical result of such education is manifested in the ability and willingness to make their own decisions and choices at the social level. Based on this, education becomes one of the main tools for ensuring individual, group and Universal Security. The sustainable development of education is one of the urgent problems of the modern educational strategy of society. Environmental education is the most specific and important component of education for Sustainable Development. Changes in modern education in the country force teachers to pay attention to the joint productive work of the teacher and the student, and its goal is to develop practical knowledge, skills, abilities, skills and experience in students. Environmental education for comprehensive development as a modern didactic system is aimed at implementing the requirements of modern state educational standards and contributes to the formation of subject knowledge, universal educational activities based on understanding the laws of Ecology and nature. A possible tool for the development of the cognitive sphere of schoolchildren is environmental education, the basics of which are studied in the lessons of the natural science field (geography, biology, chemistry), since the subject «Ecology» is not included in the school curriculum, but there is a section «chemistry and ecology» (Płotka-Wasyłka, 2021; Dicks, 2018).

Chemistry is a discipline in which environmental aspects can be included in every daily lesson. Environmental education is based on ideas about the relationship between the composition, structure, properties of substances and their biological functions, the dual role in living and inanimate nature, the biological exchange of chemical elements and the consequences of this process for living organisms. Chemistry is of great importance in solving environmental problems at the present stage. When studying the composition, structure and properties of substances, chemistry can answer questions about what happens to them in the atmosphere, soil, aquatic environment, how matter and the products of its transformation affect biological organisms. One speaks of chemistry as the culprit of an unfavorable environmental situation. (Yachina, 2018).

Not only chemical plants, but also blast furnaces, bakeries, thermal power plants, tanneries, automobiles, perfume factories, mining and pharmaceutical enterprises, ordinary cornflowers and any of us are nothing more than a chemical reactor. Everywhere various chemical reactions, useful, useless and harmful substances are formed, liquid, solid and gaseous products are produced. Most environmental disasters are due to pollution of the atmosphere, hydrosphere and lithosphere with compounds obtained as a result of a reaction that often occurs not in a chemical plant. If we agree that we cannot find harmony with nature without the help of chemistry, we will avoid mistakes. After all, he is characterized by a special ability that can only be an "attacker" and a "defender". What function will prevail depends not on chemistry, but on you and US. (Bobizoda, 2022; Bakirova, 2014).

The main role in the development of interest in chemistry is played by students' understanding of the causes of contradictions in the system "Nature-Society". How can we explain the behavior of a substance in the atmosphere, body of water, soil or in the human body, how does it itself and the products of its transformation affect natural systems?

Chemistry and ecology serve as a link between the inanimate and the living. In the course of classes in the laboratory of Applied Ecology, it is possible to clearly and convincingly demonstrate both the negative aspects of human intervention in the natural environment and possible ways to optimize anthropogenic impact on it (Solovjeva, 2015; Perfilova, 2011).

Purpose of the study

In many developed countries, the formation of ecological culture and environmental consciousness is an integral part of the education of the population, which includes environmental literacy, awareness, reliability and activity in the Daily implementation of the norms of rational nature management. In our country, Environmental Education takes place mainly in educational institutions of various levels. The ways to implement the goals of environmental education at school can be different: the ecologization of academic disciplines, the creation of integrated courses, the introduction into the practice of teaching a special discipline that reveals the problems of Ecology and environmental protection from pollution. The main goal of the research work we propose is to form the foundations of environmental education in the course of daily classes in the study of chemistry. The result of this is an increase in students' interest in chemistry, an increase

in the quality of knowledge. Formation of environmental competence in schoolchildren: a positive approach to environmental ecology; creation of a system of continuous environmental education; students of a public position; identification of the relationship between theoretical and scientific and practical activities; formation of the foundations of a healthy lifestyle; formation and development of interdisciplinary ties in the study of environmental problems (chemistry - geography, chemistry – biology, chemistry – economics, chemistry – sociology).

Materials and methods

The research work is based on experiments in chemistry in Grades 9"A" and 9"B" of Abai Secondary school №15 in Atyrau. In the 9th "A" class, environmental education was integrated into the chemistry lesson, and the 9th "B" class was held as a traditional (new format) lesson. 9 "A" class chemistry lessons were taught on the following topics with integrated environmental education:

1. *Lesson topic:* General characteristics of metals

Training goals:

9.1.4.1-be able to explain the properties of metals using knowledge of metallic bonds and metallic crystal lattice

9.1.4.2-to describe the physical and chemical properties characteristic of metals and explain that metal atoms only exhibit reducing properties

Integrated environmental concepts, questions covered: the penetration of heavy metals such as copper, lead and zinc into the tissues of the human body leads to oncological diseases, abnormalities of the heart, blood vessels. Therefore, cleaning the water composition from heavy metal ions is an important and complex task.

1. What are the functions and effects of metal ions in the human body?
2. What are the ways of environmental pollution of ferrous metallurgy enterprises?
3. The concept of heavy metal pollution? (Florentina, 2015; Ismail, 2011).

2. *Topic of the lesson:* Ingots of metals. Demonstration №5 "metals and ingots"

Training goals:

9.1.4.3-knowledge of the concept of casting and its advantages

9.1.4.4-comparison of the composition and properties of cast iron and steel

9.4.2.5-naming metal deposits in Kazakhstan and explaining the processes of their production, impact on the environment

Integrated environmental concepts, questions covered: ferrous metallurgy enterprises have a large share of environmental pollution, which releases 15 % sulfur dioxide, 15–20 % nitrogen oxide, 15 % industrial dust and pollen into the air. At the same time, about 200 million tons of solid waste occupy large areas of fertile land.

3. *Topic of the lesson:* extraction of metals

Training goals:

9.4.2.6-description of the process of metal extraction from ore

Integrated environmental concepts, questions covered: what are the measures to be followed in the process of metal extraction? Analyze the following idea: "chemical, metallurgical and machine-building enterprises of Russia and Kazakhstan dump untreated waste into the Ural River. As a result of this, the fields where the seeds of

very valuable sturgeon are sprayed are poisoned, and the Atyrau region suffers a lot of damage." (Wang, 2018; Torsykbayeva, 2023).

4. *Topic of the lesson:* metals of Group (I) and Group (II) and their compounds.

Training goals:

9.2.1.1-explanation of the general properties of alkali metals based on atomic structure

9.2.1.2- compilation of reaction equations characterizing the basic properties of oxides and hydroxides of alkali metals

9.2.1.3-comparison of the general properties of metals of Group 1 (I) DST and Group 2 (II) and compilation of reaction equations

9.2.1.4-explanation of the basic properties and description of the application of calcium oxide and hydroxide

Integrated environmental concepts, questions covered: pollution of the feeding environment: the transition of calcium to strontium in the human and animal body. The concept of hardness. Why is hard water not used when washing car engines? Environmental impact of hard water? (Karaev, 2023; Kalimukasheva, 2022).

5. *Topic of the lesson:* metals of Group 13 (III). Aluminum and its compounds.

Training goals:

9.2.1.5-explain the properties of aluminum based on atomic structure, name the application area of its important compounds and castings

9.2.1.6-study of the dual properties of aluminum, its oxide and hydroxide

Integrated environmental concepts, questions covered: the effect of aluminum on the human nervous system

6. *Topic of the lesson:* practical work № 4 solving experimental problems on the topic "Metals"

Training goals:

9.2.1.7-planning and conducting experiments related to the interaction of metals of Groups 1 (I), 2 (II), 13 (III) with simple and complex substances;

Integrated environmental concepts, questions covered: solving environmental problems

7. *Topic of the lesson:* Halogens. Chlorine

Training goals:

9.1.4.5- compilation of electronic formulas of halogen molecules and determination of crystal lattice type and Bond type

9.2.1.8-prediction of the laws of change in the properties of halogens in the group

9.2.1.9-description of chemical properties of chlorine: interaction with metals, hydrogen and halides

Integrated environmental concepts, questions covered: what properties can explain the use of chlorine as a bleach in everyday life? What is the role of chlorine in water purification?

8. *Topic of the lesson:* 16 (VI)-group elements. Sulfur. Sulfur compounds

Training goals:

9.2.1.11-16 (VI) - description of the general property of group elements

9.2.1.12-comparison of the physical properties of allotropic changes in sulfur and compilation of reaction equations reflecting the chemical properties of sulfur

9.2.1.13-comparison of the physical and chemical properties of sulfur (IV) and (VI) oxides and explanation of the physiological effects of sulfur dioxide

9.4.2.1-explanation of the cause of acid rain and its impact on the environment

Integrated environmental concepts, questions covered: knowledge and understanding of the physical and chemical properties of sulfur compounds. Understand the physiological properties of sulfur compounds. Understand the cause of acid rain and its impact on the environment. Identification of ways to solve environmental problems in our region (Atyrau region)

9.Topic of the lesson: sulfuric acid and its salts. Practical work No. 5 "Study of the chemical properties of dilute sulfuric acid solution and its salts"

Training goals:

9.2.1.14-study of the physical and chemical properties of sulfuric acid solution and its salts


Integrated environmental concepts, questions to be covered: full familiarization with the concept of "acid rain". Study of the impact of sulfuric acid on the environment. In the Ural River in our region (Atyrau region), tons of fish die every year and their number increases from year to year. Could this story be related to the ANPZ? (Kalimanova, 2019).



Table 1

Short-term plan for Grade 9 "a"

Unit	9.3 A 17 (VII), 16 (VI), 15 (VI), 14 (IV) -group elements and their compounds	
Teacher's name:	Aleshova Aidana Abaikyzy	
Date:		
Class:9 "a"	number of participants	number of non-participants
Lesson topic:	Sulfur compounds	
Purpose of training according to the curriculum	9.2.1.13-comparison of the physical and chemical properties of sulfur (IV) and (VI) oxides and explanation of the physiological effects of sulfur dioxide 9.4.2.1-explanation of the cause of acid rain and its impact on the environment	
Purpose of the lesson:	- comparison of the physical and chemical properties of sulfur (IV) and (VI) oxides and explains the physiological effects of sulfur dioxide. - acid rain explains the cause and impact on the environment.	

The course of the lesson:

Period/time of the lesson	Teacher's actions	Student's actions	Evaluation	Resources
Beginning of the lesson Organization 3minutes	Welcomes students, checks their attendance Represents the topic of the lesson and the purpose of the lesson. Division into groups. Groups students according to the " QR" code method	By selecting and scanning the papers presented in front of them, they unite in 3 groups.	Oral feedback	

<p>Repeating the past 5 minutes</p>	<p>Repetition of the past topic checking homework using the "truth-false" method.</p>	<p>the "true - false" method, answer the questions asked. 1. sulfur is in group VI of the periodic table 2. sulfur is yellow, poorly soluble in water, does not conduct heat and current 3. Sulfur does not occur in nature in a free state, because it is very active 4. Sulfur is an environmentally polluted element 5. used in the production of sulfur rubber</p>	<p>The teacher's opinion. Great job! Good luck! stickers with the inscription</p>	
<p>Middle of the lesson Introduction to a new lesson 10 minutes</p>	<p>In order to reveal the topic of a new lesson, a preliminary text is given. "In 1963, scientists studying the Hubbard Brook Experimental Forest made a shocking discovery. They have been studying rainwater non-stop for years, but according to a recent study, recent rain samples were nearly 100 times more acidic than usual; this could destroy the region's ecosystem in decades. What caused this deadly rain? And what can be done to stop it?" Students are introduced to the topic and purpose of the new lesson, and each group is given a task to set a goal for this lesson</p>	<p>Students analyze and discuss the lesson Determines the topic of the new lesson. Watching the video show, listening and forming an idea. Each group sets a goal for today's lesson: <i>"To know and understand the physical and chemical properties of sulfur compounds"</i> <i>Understanding the physiological properties of sulfur compounds</i> <i>Understanding the cause of acid rain and its impact on the environment"</i> Additional purpose: <i>"Identification of ways to solve environmental problems in our region (Atyrau region)"</i></p>		<p>Слайд Видео https://youtu.be/DnJH8wp-MEQU?si=eat63yoO-J506EANP </p>
<p>15 минут</p>	<p><i>Task for Functional Literacy. Teamwork. Each group is assigned a theme on the same topic Group 1. "Poster" Group 2 "News Service"</i></p>	<p>Group 1. "Poster" Physical and chemical properties of sulfur compounds Group 2 "News Service" What is the threat posed by sulfur compounds to the environment? Why is</p>	<p>The descriptor - physical and chemical properties of sulfur compounds - Reveals the environmental</p>	<p>Poster, cross-section paper, stickers laptop mobile phone</p>


	<i>Group 3 is transferred to the defense of the topic using the "interview" method</i>	the ecological situation in Atyrau region so bad? Group 3 " Interview "(interview with an ecologist) What are the measures to prevent contamination with sulfur compounds? Are there ways to solve the problems of pollution with sulfur compounds in Atyrau region?	problem of Atyrau region - determines the effect of sulfuric acid compounds on the environment - offers solutions to the problem	
Tasks for fixing the lesson 6 minutes	Individual work: Performs, monitors, shows examples, examples of tasks in the task heading 1,2.	Task 1 What is the density of sulfur dioxide compared to air and hydrogen? Task 2. Among the reactions below, find an equation showing both the oxidative and reducing properties of sulfur. Explain the reason: A) $\text{SO}_2 + \text{Na}_2\text{O} = \text{Na}_2\text{SO}_3$; b) $5\text{SO}_3 + 2\text{P} = \text{P}_2\text{O}_3 + 5\text{SO}_2$; c) $\text{SO}_2 + 2\text{NaOH} = \text{Na}_2\text{SO}_3 + \text{H}_2\text{O}$; d) $\text{SO}_3 + \text{Na}_2\text{O} = \text{Na}_2\text{SO}_4$; e) $2\text{SO}_2 + \text{O}_2 = 2\text{SO}_3$	The descriptor - calculates the density of sulfur dioxide compared to air - calculates the density of sulfur dioxide compared to hydrogen Дескриптор:	Textbook for the 9th grade Workbook.
End of the lesson 3 minutes Conclusion Reflection Student assessment, homework assignment	Reflex is created using the "Mentimeter" method Homework & 30 C-1	Students create feedback with the teacher using a QR code I understood the lesson, it was very interesting I liked the lesson, but there were some small mistakes.. I was not interested in the lesson. I didn't complete the tasks.	Self-assessment It is estimated in the range from 1 to 10 points	




Table 2


Short-term plan for Grade 9 "B"

Unit	9.3 A 17 (VII), 16 (VI), 15 (VI), 14 (IV) -group elements and their compounds	
Teacher's name:	Aleshova Aidana Abaikyzy	
Date:		
Class:9 "B"	number of participants	number of non-participants
Lesson topic:	Sulfur compounds	

Purpose of training according to the curriculum	9.2.1.13-comparison of the physical and chemical properties of sulfur (IV) and (VI) oxides and explanation of the physiological effects of sulfur dioxide 9.4.2.1-explanation of the cause of acid rain and its impact on the environment
Purpose of the lesson:	- comparison of the physical and chemical properties of sulfur (IV) and (VI) oxides and explains the physiological effects of sulfur dioxide. - acid rain explains the cause and impact on the environment.

The course of the lesson:

Period/time of the lesson	Teacher's actions	Student's actions	Evaluation	Resources
Beginning of the lesson Organization 3minutes	Welcomes students, checks their attendance Represents the topic of the lesson and the purpose of the lesson. Division into groups. Groups students according to the " QR" code method	By selecting and scanning the papers presented in front of them, they unite in 3 groups.	Oral feedback	
Repeating the past 5 minutes	Repetition of the completed topic - "wordwall.net "- checking homework using the "wheel" method in the program	team up with the group using the" coleso " method and answer the questions given. 1. Where is sulfur in the periodic table? 2. tell the atomic structure of sulfur 3. where sulfur is used 4. What do you know about the distribution of sulfur in nature	The teacher's opinion. Great job!Good luck! stickers with the inscription	
Middle of the lesson Introduction to a new lesson 10 minutes	The topic of the lesson and the goals to be achieved are introduced. The production method and conditions for obtaining sulfur compounds in the laboratory are shown in a video clip	<i>Watch the video. Read the textbook. They get acquainted with the reference words, write down the equations of reactions in their notebooks.</i>		Слайд Видео 
Teamwork 6 min	Performs task 1 in the task header, monitors, shows an example, example.	1. Task Question to students: Where Are sulfur compounds used? (Students express their thoughts. When listening to students ' opinions, it is	The descriptor: Total-4 points Differentiation: the "Dialogue and Support" method of differentiation is manifested here. To help answer	Poster, cross-section paper, stickers

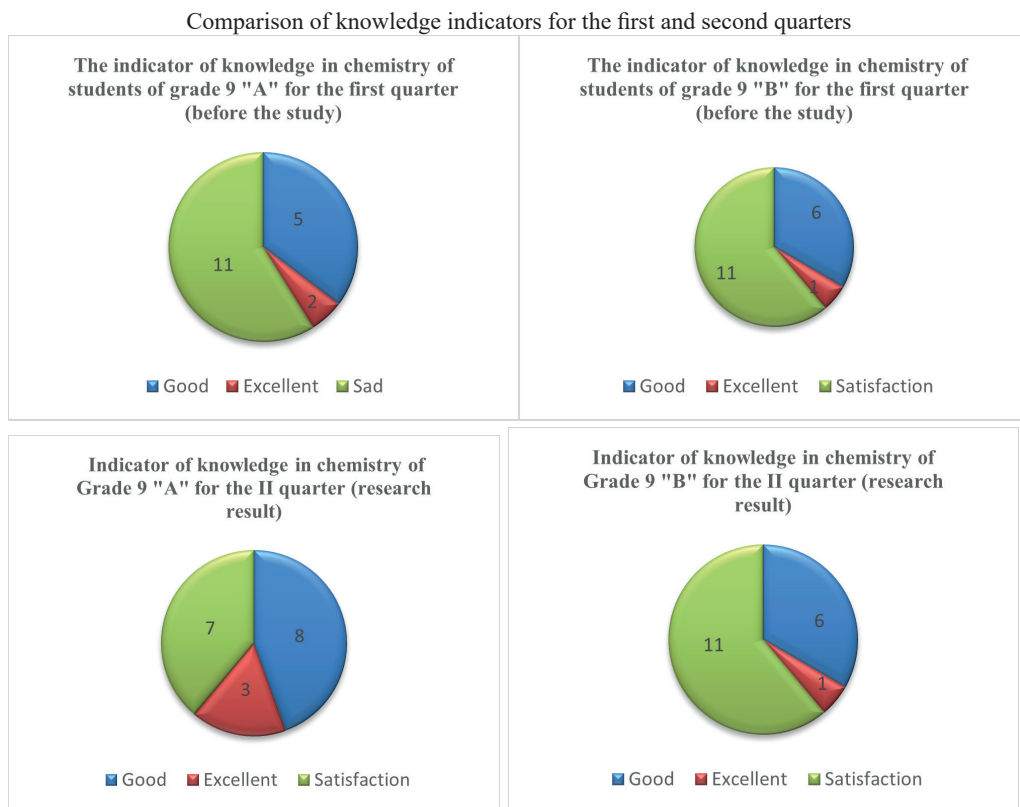
		important to listen and draw conclusions without interrupting).	in the right way, some students are asked open-ended questions, and some students in need of help are asked leading questions.	
Tasks for fixing the lesson 6 minutes	Individual work: Performs, monitors, shows examples, examples of tasks in the task heading 2,3.	2. Task Working with text Sulfur forms three different oxides: S (IV) oxide SO ₂ (sulfur gas or sulfur dioxide), which is a yellow, suffocating pungent-smelling gas. Sulfur (VI) oxide, sulfur anhydride-so, volatile, colorless liquid. Sulfur (VIII) oxide - so. They are well soluble in water, resulting in the formation of sulfuric acid H ₂ SO ₄ and sulfuric acid H ₂ SO ₄ , so it turns out that these are acidic oxides. Task 3 1. What is the oxide formula if m(S): m(O)-1: 1? Find its density in comparison with air and the mass of 1 liter (KJ). 2. how much air is needed to oxidize sulfur (IV) oxide with a volume of 30 m ³ ?	Descriptor: total-3 points Descriptor: Total-4 points 1 point for each correct answer	Textbook for the 9th grade Workbook.
End of the lesson 3 minutes Conclusion Reflection Student assessment, homework assignment	The reflex is created using a padlet board	Students provide feedback to the teacher via qr code Provides feedback on how the lesson went, if he has misunderstood questions about the lesson, or by giving the teacher a grade	Self-assessment It is estimated in the range from 1 to 10 points	

Results and their discussion

The results of the study are shown in the comparison below. Monitoring of the

educational achievements of students of grades 9 "A" and 9 "B" has been carried out, as a result of which it is possible to see an increase in the quality of education of students of Grade 9 "a", who have integrated environmental education into the educational process, and an increase in students' interest in the subject. The research work was obtained based on the results of the study of the evaluation indicators of the i-th and ii-th quarters. In the 9th grade "A" there are 18 students, where the best-2, the Accent-5, the average-11. in the 9th grade " B " there are 18 students, the best-1, the Accent-6, the average-10. As a result of the study, at the end of the second quarter, the ranks of the best in the 9th "a" grade increased by 1 student, the emphasis-by 3 students. No changes were observed in the 9 "B" Class. These results are shown in the diagram below.

Picture 1



Conclusion

As a result of the selection of material on the main topics of the chemistry course and the integrated study of environmental knowledge in daily classes, students not only improve the quality of knowledge, but also become interested in the subject, reveal the ability to cognitive creativity. This also contributes to the fact that in the future they will freely, without mistakes, choose the desired profession. Questions, demonstration and laboratory experiments on each topic were selected. The topics of reports and messages were presented to the students. A number of allocated nature protection, the need to pay attention to them was noted during the lesson. The results of research activities to

study the environmental comfort of school premises were given by specifying a short-term plan. The skills of action acquired in Chemistry Lessons significantly increase the quality and degree of learning of students. Allows students to gain knowledge in other subjects. The presented material can be used to work in classes and extracurricular hours. The methodological development carried out as a result of scientific research can be introduced into the educational process of general educational institutions.

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

Подписано в печать 15.03.2024.
Формат 60x88¹/₈. Бумага офсетная. Печать – ризограф.
13,0 п.л. Тираж 300. Заказ 1.