ISNN 3030-3907

2026
MAY
ISSUE - 5
VOLUME -12

# DEVELOPMENT OF SCIENCE

## scientific journal



# Development of science

## Ilmiy jurnal

MAY 2026
Issue - 5, VOLUME – 12

ISSN 3030 -3907

*Ilmiy jurnal OAK rayosatining 2024 yil 27 sentabrdagi 361-son qaroriga asosan 02.00.00 kimyo fanlari hamda 2025 yil 12 fevral 367- son qaroriga asosan 05.00.00 texnika fanlari bo‘yicha falsafa doktori (PhD) va fan doktori (DSc) ilmiy darajasiga talabgorlarning dissertatsiya ishlari yuzasidan dissertatsiyalari asosiy ilmiy natijalarini chop etish tavsiya etilgan milliy ilmiy nashrlar ro‘yxatiga kiritilgan.*

**BOSH MUHARRIR:**
***Temirov Alisher Hoshim o‘g‘li – texnika fanlari falsafa doktori (PhD),Dotsent.***
**TAHRIRIYAT KENGASH RAISI:**
***Fozilov Sadriddin Fayzullayevich – texnika fanlari doktori, professor***
***TAHRIRIYAT KENGASH A’ZOLARI***

**TEXNIKA FANLARI/ TECHNICAL SCIENCES/ ТЕХНИЧЕСКИЕ НАУКИ**

***Bozorov G‘ayrat Rashidovich***
*Buxoro Davlat Texnika Universiteti, professor*
***Abdurahmonov Olim Rustamovich***
*Buxoro Davlat Texnika Universiteti, professor*
***Adizov Bobur Zamirovich***
*O‘zbekiston Respublikasi Fanlar akademiyasi Umumiy va noorganik kimyo instituti, professor*
***Hayitov Ruslan Rustamjonovich***
*Buxoro Davlat Texnika Universiteti, professor*
***Jumayev Qayum Karimovich***
*Buxoro Davlat Texnika Universiteti, professor.*
***Berdiyev Dorob Murodovich***
*Islom Karimov nomidagi Toshkent Davlat Texnika Universiteti, professor*
***Maxmudov Rafiq Amonovich***
*Buxoro Davlat Texnika Universiteti, professor.*
***Tilloyev Lochin Ismatilloyevich***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Raxmonov Qahramon Sanakulovich***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Barakayev Nusratullo Rajabovich***
*Islom Karimov nomidagi Toshkent Davlat Texnika Universiteti, professor.*
***Jo‘rayev Xayrullo Fayziyevich***
*Buxoro Davlat Texnika Universiteti, professor.*
***Panoyev Erali Rajabboyevich***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Ataullayev Sherzod Nabiullyevich***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Murodov Malik Negmurodovich***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Axmedova Ozoda Bahronovna***
*Islom Karimov nomidagi Toshkent Davlat Texnika Universiteti.*
***Safarov Bahri Jumayevich***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Xaydarov Axtam Amonovich***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Safarov Jasur Alijon o‘g‘li***
*Buxoro Davlat Texnika Universiteti, dotsent.*

**KIMYO FANLARI/ CHEMICAL SCIENCES/ ХИМИЧЕСКИЕ НАУКИ**

***Axmedov Voxid Nizomovich***
*Buxoro Davlat Texnika Universiteti, professor*
***Umarov Baqo Bafoyevich***
*Buxoro Davlat Universiteti, professor*
***Kodirov Abduaxad Abduraximovich***
*Qarshi davlat Universiteti, professor*
***Qurbonov Mingniqul Jumagulovich***
*Qarshi davlat Universiteti, dotsent*
***Turemuratov Sharibay Naurizbaevich***
*O‘zbekiston Respublikasi Fanlar akademiyasi Qoraqalpog‘iston bo‘limi Bosh ilmiy kotibi, professor*
***Tursunov Kaxor Shonazarovich***
*Qarshi davlat Universiteti, professor*
***Do‘stov Hamro***
*Buxoro Davlat Texnika Universiteti, professor*
***Panoyev Nodir Shavkatovich***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Olimov Bobur Bahodir o‘g‘li***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Kasimov Sherzod Abduazimovich***
*Termiz Davlat Universiteti, professor.*
***Aliqulov Rustam Valiyevich***
*Termiz Davlat Universiteti, professor*
***Tropov Xamza Tursunovich***
*Samarqand Davlat Universiteti, professor*

**IQTISODIYOT FANLARI/ ECONOMICS/ ЭКОНОМИЧЕСКИЕ НАУКИ**

***Nizamov Aslitdin Badreddinovich***
*Buxoro Davlat Texnika Universiteti, professor.*
***Boboyev Akmal Choriyevich***
*Buxoro Davlat Texnika Universiteti, professor.*
***Ergashxojayeva Shaxnoza Djasurovna***
*Toshkent davlat iqtisodiyot universiteti, professor*
***Saidaxmedova Nodira Ilxomovna***
*Toshkent davlat iqtisodiyot universiteti, professor*
***Muxsinov Bekzod Toxirovich***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Shakarov Qulmat Ashirovich***
*Renessans ta'lim universiteti,dotsent.*
***Jumaeva Zulfiya Qayumovna***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Norova Salomat Yusupovna***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Avezova Shaxnoza Maxmudjonovna***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Jalilov Jamshid G‘anijonovich***
*Toshkent davlat iqtisodiyot universiteti, dotsent*
***Xasanova Gulruh Djumanazarovna***
*Buxoro Davlat Texnika Universiteti, dotsent.*

**PEDAGOGIKA FANLARI/ PEDAGOGICAL SCIENCES / ПЕДАГОГИЧЕСКИЕ НАУКИ**

***Siddiqova Sadoqat G‘afforovna***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Zoyirov Erkin Xalilovich***
*Buxoro Davlat Texnika Universiteti, DSc, professor*
***Gaffarov Feruz Hasanovich***
Puchon Universiteti, *professor*
***Ruziyev Davron Yuldashevich***
*Buxoro Davlat Universiteti, professor*
***Muradova Firuza Rashidovna***
*Buxoro Davlat Texnika Universiteti, professor.*
***Yunusova Gulandon Samiyevna***
*Buxoro Davlat Texnika Universiteti, professor.*
***To‘xtayeva Zebo Sharifovna***
*Buxoro Davlat Texnika Universiteti, professor.*
***Navro‘zova Gulchixra Nigmatovna***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Uzoqova Laylo Polvonovna***
*Buxoro muhandislik – texnologiya instituti, dotsent.*
***To‘raqulova Marjona Qiyom qizi***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Muradova Zarina Rashidovna***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Murodov Sanjar Aslonovich***
*Buxoro Davlat Texnika Universiteti, dotsent.*
***Shodiyev Jahongir Jo‘raqulovich***
*Buxoro Davlat Texnika Universiteti, dotsent*
***Gaffarov Laziz Hasanovich***
*Buxoro muhandislik – texnologiya instituti, dotsent.*

Tahririyat a’zolarning to‘liq ro‘yxati jurnalning www.devos.uz saytida keltirilgan.

Tahririyat hay’ati a’zolarining tarkibini o‘zgartirish hamda qo‘shimcha kiritish yoki tahririyat a’zoligidan chiqarish bosh muharrir tomonidan amalga oshiriladi.


ISSN 3030-3907

**Development of science** ilmiy jurnali 2024 yil 15 aprel kuni №256445 sonli guvohnoma bilan Davlat ro‘yxatidan o‘tgan.

To‘plam elektron ko‘rinishda (pdf formatida) mualliflarga taqdim etiladi. To‘plamga kiritiladigan maqolalarning mazmuni, ulardagi statistik ma’lumotlar va me’yoriy hujjatlarning to‘g‘riligiga hamda har qanday fikr - mulohazalarga mualliflarning o‘zlari mas’ul hisoblanadilar. Talablarga javob bermaydigan maqolalar to‘plamga kiritilmaydi. Tashkiliy qo‘mita maqola matnini qisqartirish, qisman tuzatish kiritish, seksiyalarga joylashtirish huquqiga ega.


ISSN 3030-3907

# TECHNOLOGY FOR OBTAINING DRILLING FLUIDS FROM PAS STABILIZERS BASED ON MOLASSES CELLULOSE AND BASALT FIBER WITH IMPROVED PROPERTIES FOR EVAPORATING FLUIDS

**Sattorov Laziz Kholmurodovich**
*Docent Karshi state technical university, Karshi, Uzbekistan*
*E-mail:sattorovlaziz@gmail.com*
*(ORCID: 0009-0005-9028-1225)*
*Tel: +998 97 382-84-89*
**Kurbanov Abdiraxim Axmedovich**
*Professor Bukhara state technical university, Bukhara, Uzbekistan*
*E-mail:bo_bosh@mail.ru*
*(ORCID:0009-0008-3484-2851)*
*Tel: +9989936618169*
**Rahmatov Xudoyor Boboniyozovich**
*Professor Karshi state technical university, Karshi, Uzbekistan*
*E-mail:Zavod.lab@mail.ru*
*(ORCID: 0000-0003-4976-5541*
*Tel: +998 91 460 85 95*
**Juraeva Huriyat Zoirovna**
*Lecturer of the University of Economics and Pedagogy, Karshi, Uzbekistan*
*E-mail: Huriyat_2025@gmail.com*
*(ORCID: 0009-0005-4875-0577)*
*Tel: +99897 460-81-89*

**Annotatsiya.** Neft va gaz sanoatida burg‘ilash qorishmalari uchun barqarorlashtiruvchi reagentlar asosida xossalari yaxshilangan baritli og‘irlashtirgichlarni modifikatsiyalash, shuningdek, lignin asosidagi ishqoriy shlamni ingibitor sifatida qayta ishlash texnologiyasini o‘zlashtirish va ishlab chiqarishga joriy etish bo‘yicha bir qator amaliy tadqiqotlar o‘tkazildi.

**Kalit so‘zlar:** burg‘ilash qorishmalari, barit og‘irlashtirgich, polianion sellyuloza, bazalt tolasi, lignin, stabilizator reagentlar, Na-KMS, neft-gaz sanoati

**Аннотация.** Проведен ряд прикладных исследований по модификации баритовых утяжелителей с улучшенными свойствами для буровых смесей в нефтегазовой промышленности на основе стабилизирующих реагентов, а также по освоению и внедрению в производство технологии переработки щелочных шламов на основе лигнина в качестве ингибитора.

**Ключевые слова:** буровые растворы, баритовый утяжелитель, полианионная целлюлоза, базальтовое волокно, лигнин, стабилизирующие реагенты, Na-КМЦ, нефтегазовая промышленность.

**Annotation.** several applied research works have been conducted to modify barite weighting agents with improved properties for drilling mixtures in the oil and gas industry based on stabilizing reagents, as well as to master and implement into production the technology for processing lignin-based alkaline sludge as an inhibitor.

**Keywords:** drilling fluids, barite weighting agent, polyanionic cellulose, basalt fiber, lignin, stabilizing reagents, Na-CMC, oil and gas industry.

**INTRODUCTION.**

Several applied research works have been carried out to modify barite weighting agents with improved properties for drilling fluids in the oil and gas industry based on stabilizing reagents, as well as to master and implement into production the technology for processing lignin-based alkaline sludge as an inhibitor.

In the process of obtaining cellulose from safflower stems, it can be observed that the influence of an alkali solution has a positive effect on certain quality indicators, including ash content, α-cellulose, and whiteness, while negatively affecting the degree of its polymerization. In this case, the alkali concentration of 40 g/l was selected as the optimal for the sorghum stalk. Based on this parameter, the yield of cellulose is 36.1%, α-cellulose is 89.5%, and the degree of polymerization is 600.

In this section, the results of the study and analysis of the processes of using the obtained Na-CMC and the base as a stabilizing reagent for drilling fluids, the use of lignin in the alkaline slurry as an inhibitor in the process of extracting cellulose from drilling fluids and its study, the development of technology for processing stabilizing reagents and lignin-based alkaline slurry as an inhibitor in the modification of barite weighting agents for drilling fluids, as well as the fundamental scheme of the technology for processing stabilizing reagents and lignin-based alkaline slurry as an inhibitor in the modification of barite weighting agents with improved properties for drilling fluids in the oil and gas industry are widely covered.

During the peak of oil and gas well opening in the 1960s and 1980s, these black gold reserves were located in the less distant - shallow - depths of the Earth's crust. This practically eliminated the need for drilling fluids containing high molecular weight cellulose esters and various modifiable components. At the same time, the probability of destruction of the composition of drilling fluids continuously supplied to the wells was significantly lower, and the temperature during the drilling process was 80-1200C. At such temperatures, the decay of the elementary rings of the macromolecules of ethers based on natural polymers in drilling fluids practically does not occur. Years later, oil and gas reserves began


ISSN 3030-3907

to be extracted from deep underground layers. This began to require drilling fluids to be resistant to various negative factors. During the drilling process, it was observed that the very large amount of heat released causes the stabilizer and additional components in the solution to enter a destructive state. Additionally, various weighting agents were required to ensure that drilling fluids reached deep layers. Extreme high temperatures require the use of inhibitors in the phase to prevent the breakdown of elemental rings within the macromolecule. In order to eliminate such negative consequences, we have been working for years to create a technology for modifying barite weighting agents with improved properties for drilling mixtures. Barite concentrate grade KB-3 is a mineral substance with a density of 4.10–4.20 g/cm2 that meets the requirements of GOST 4682-84 and is used in large quantities as a raw material for the national economy and various industrial enterprises. The concentration of barite and barite-based alloys - mixtures will be used as a raw material in this presented innovative project to develop a technology for modifying barite weighers with improved properties for drilling mixtures in the oil and gas industry. The demand of JSC "Uzbekneftegaz" for barite weighers for drilling fluids is 30,000 tons per year. To meet this demand, imports from the Republic of Kazakhstan were ensured in exchange for significant foreign currency.

The adoption of Cabinet of Ministers Resolution No. 296 dated November 12, 2009, gave impetus to the organization of large-scale production of barite and barite concentrates in the Republic. In the innovative project, practical work is also being carried out to modify barite concentrates into drilling fluids as a composite, serving as a weighting agent for drilling deep-seated oil and gas wells, as well as to ensure its (Barit) activity in solutions that prevent groundwater leakage from oil wells during various underground collapses and the sharp cutting of solid mineral elements, to ensure modification compatibility with reagents of other compositions, and to achieve high results. Such work was mainly carried out by us in laboratory conditions, and the positive results obtained under laboratory conditions were obtained in experimental testing units at production enterprises and production departments specializing in the production of CMC and PAS, which are the main raw materials for drilling fluids available in our Republic.


ISSN 3030-3907

**Table 1**

**"Chemical reagent produced by "PROMXIM IMPEKS" LLC and "TIKTITI" (polyanionic cellulose based on fibrous waste from textile enterprises and basalt fiber)**

*(the analysis was conducted in accordance with the requirements of TSH 39.3-275:2011 - for the stabilizing capacity of drilling fluid filtration)*

| Indicators | "PROMXIM IMPEX" LLC | | | "Tashkent Research Institute of Innovative Chemical Technology" | | |
|---|---|---|---|---|---|---|
| | Technical requirement | Available wearing | Analysis results | Technical requirement | Available content | Conclusion analysis |
| Water loss of a completely dry KMS clay solution, with a mass fraction of 0.75 (calculated for the main substance) $cm^3$ minutes, not more | 4.0 | 3.0 | Matches | 4.0 | 3.8 | Matches |
| Water fraction by mass, not much | 10 | 9. | Matches | 10 | 10 | Matches |
| Hydrogen index, pH 1.5% in aqueous solution | 6, 10. | 7. | Matches | 6.0-10 | 7. | Matches |

Chemical reagent produced by "PROMXIM IMPEKS" LLC and "TIKTITI" (cellulose from fibrous waste of textile enterprises and wormwood stalks, as well as polyanion cellulose based on basalt fiber) (*analysis was conducted in accordance with TSH 39.3-275:2011 requirements - according to the stabilizing capacity of drilling fluid filtration)* From the table, it can be seen that the reagent mixture containing barite aggravators is characterized by its use as a stabilizing raw material for the oil and gas industry. To further improve the extraction of barite and its concentrates, "Neftegazmineral" LLC was established under the jurisdiction of JSC "Uzgeoburneftegaz," which is engaged in the processing of "Saribulak" barite ores and the production of barite and barite concentrates based on them under license No. TV-0198. More than 38.7 thousand


ISSN 3030-3907

tons of barite concentrates of categories C1 and C2 were discovered at the "Saribulak" barite ore deposit. Barite and concentrates of these categories, i.e., KB-6 concentrate, meet the grades established by GOST 4682-84.

For more than 10 years, we have been developing a technology for modifying barite weighers with improved properties for drilling fluids, using barite concentrate KB-6 of category $C_1$-$C_2$ obtained at the "Saribulak" barite ore deposit, which meets the grades specified in GOST 4682-84, as the object.

Its use as a weighting agent in drilling fluids led not only to its positive effect as a bentonite and weighting agent, but also to a partial reduction in drilling heat and the destruction of elemental rings in the polymer macromolecule, significantly reducing the degree of water impermeability by 3-4.5.

In the course of the research, the creation of a technology for modifying weighing agents based on barite ores with improved properties for drilling mixtures from local raw materials and their introduction into industrial production. In this way, a component is obtained that can replace the import of barite concentrates imported from abroad for a large amount of currency, is export-oriented, and differs from its analogues by its low cost and several times higher efficiency.

The use of lignin in the alkaline sludge formed during the extraction of cellulose from drilling fluids as an inhibitor and the use of lignin in the alkaline sludge formed during the extraction of cellulose from drilling fluids as an inhibitor at the research stage are shown.

**Lignin.** is a natural complex polymer substance. Mol. m. From 1000 to 150,000, density 1250–1450 kg/m3. It is found in the cells of vascular plants. Lignin accumulates in the cell walls, woodens the cell, and makes it stronger. Broad-leaved trees contain 20–30%, while coniferous trees contain up to 50% lignin. The L. molecule consists of substances formed during the polymerization of aromatic alcohols. Lignin is a yellow-brown amorphous substance that is insoluble in water and organic solvents. Lignin accumulates in cell membranes, making the cell lignified and strong. Broad-leaved trees contain 20–30%, while coniferous trees contain up to 50% lignin. The lignin molecule consists of substances formed during the polymerization of aromatic alcohols. Lignin is a yellow-brown amorphous substance, insoluble in water and organic solvents. Lignin is formed as follows: cyclic acid – phenylalanine – cinnamon acid – ferulic acid – coniferous alcohol – L. L. cellulose and hydrolysis is a waste productin the industry. It is used as a raw material in the production of fuel, granular activated carbon, porous bricks, fertilizers, fillers, and plastics.


ISSN 3030-3907

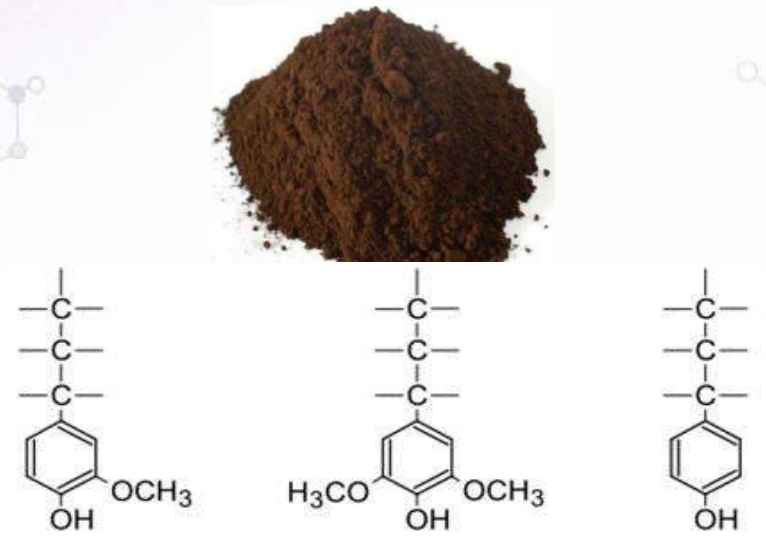



**Figure 2: Structural units of lignin**

The lignin extracted during the extraction of cellulose from sorghum stalks was used as an inhibitor for the stabilization of drilling fluids by adding a technical reagent to the mass during the synthesis of CMC and PAS.

At the same time, it has been proven through research analysis that phenol, benzene, hydroxyl, and carbonyl groups in lignin are used as protective inhibitors to prevent thermal destruction during drilling, which prevents partial heat absorption and the breakdown of the reagent macromolecule.

## USED LITERATURE

1. M.M. Murodov. "Technology of making cellulose and its ethers using raw materials" // International Conference "Renewable Wood and Plant Resources: Chemistry, Technology, Pharmacology, and Medicine." Saint Petersburg, Russia. June 21-24. 142-143.

2. M.M. Murodov. "The technology of making carboxymethyl cellulose (cmc) by method monoapparatus" // International Conference "Renewable Wood and Plant Resources: Chemistry, Technology, Pharmacology, and Medicine." Saint Petersburg, Russia. June 21-24. 141-142.

3. Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 520 dated August 27, 2020 "ON MEASURES TO CREATE FAST-GROWING AND INDUSTRIAL PAVLONIUM PLANTS IN THE REPUBLIC."

4. Internet: https://xs.uz/uzkr/post/–Pavlovniya plantations will be organized in the regions/

5. Muradov, M. Kh., & Murodov, B. Kh. U. (2015). Automatically controlled photovoltaic station with a capacity of 20 kW for an educational institution. Science Time, (12 (24)), 543-547.

6. Muradov, M. M., Rakhmanberdiev, G. R., Khalikov, M. M., Egamberdiev, E. A., Negmatova, K. C., Saidov, M. M., & Mahmudova, N. (2012, July). Endurance of high molecular weight carboxymethyl cellulose in corrosive environments. In

AIP Conference Proceedings (Vol. 1459, No. 1, pp. 309-311). American Institute of Physics.

7. Murodov, M. M., Yusupova, N. F., Urabjanova, S. I., Turdibaeva, N., & Siddikov, M. A. (2021). OBTAINING A PAC FROM THE CELLULOSE OF PLANTS OF SUNFLOWER, SAFFLOWER AND WASTE FROM THE TEXTILE INDUSTRY.

8. Murodov, M. M., Yusupova, N. F., Urabjanova, S. I., Turdibaeva, N., & Siddikov, M. A. Obtaining a PAC From the Cellulose of Plants of Sunflower, Safflower and Waste From the Textile Industry. European Journal of Humanities and Educational Advances, 2 (1), 13-15.

9. Murodov, M. M., Khudoyarov, O. F., & Urozov, M. Q. (2018). Technology for producing carboxymethylcellulose using local raw materials. Advanced Engineering Forum Vols. 8-9 (2018) pp. 411-412/©. Trans Tech Publications, Switzerland. doi, 10-9.

10. Primkulov, M. T., Rakhmonbtrdiev, G., Murodov, M. M., & Mirataev, A. A. (2014). Technology for processing cellulose-containing raw materials. Publication of the National Society of Philosophers of Uzbekistan. Tashkent, 28-29.

11. Rakhmanberdiev, G. R., & Murodov, M. M. (2011). Development of a technology for obtaining cellulose from Topinambur plants. Scientific electronic journal "Economics and Innovative Technologies," (2) , 1-11.

12. Elievich, C. L., Khasanovich, Y. S., & Murodovich, M. M. (2021). TECHNOLOGY FOR PRODUCING PAPER COMPOSITIONS FOR DIFFERENT AREAS FROM FIBER WASTE.

13. MURODOVICH, M. M., KULTURAEVICH, U. M., & MAHAMEDJANOVA, D. (2018). Development of technology for producing cellulose from tissue plants and obtaining Na-carboxymethylcellulose based on it. JournalNX, 6 (12), 407-411.

14. Rakhmonberdiev, G., Murodov, M., Negmatova, K., Negmatov, S., & Lysenko, A. (2012). Effective Technology for Obtaining Carboxymethyl Cellulose from Annual Plants. In Advanced Materials Research (Vol. 413, pp. 541-543). Trans Tech Publications Ltd.

15. Muradovich, M. M., Muradovich, H. M., & Kulturaevich, U. M. (2020). Obtaining technical carboxymethyl cellulose increased in the main substance. ACADEMICIA: AN INTERNATIONAL MULTIDISCIPLINARY RESEARCH JOURNAL, 10 (12), 717-719.

16. Murodovich, M. M., Kulturaevich, U. M., & Mahamedjanova, D. Comparative Researches of the Composition and Properties of CMC in Different Degrees of Polymerization. JournalNX, 6 (12), 412-415.


ISSN 3030-3907

17. Yuldasheva, G. I., & Teshabayeva, O. N. (2020). Development of the digital economy of the Republic of Uzbekistan. Universum: Economics and Jurisprudence, (7 (72)), 4-6.
18. Teshabaeva, O., Yuldasheva, G., & Yuldasheva, M. (2021). DEVELOPMENT OF ELECTRONIC BUSINESS IN THE REPUBLIC OF UZBEKISTAN. International, (3-3), 16-18.


ISSN 3030-3907