STUDY OF THE PROCESS OF CLEANING AND SOFTENING OF MECHANICAL MIXTURES OF NAMANGAN MEKHMASH INDUSTRIAL WATERS

Xurmamatov Abdug'affor Mirzaabdullayevich
Almalyk branch of Tashkent State Technical University named after Islam Karimov, t.f.d.,prof
Mirsaidov Maxmudjon Xabibullayevich
Teacher of Namangan Institute of Engineering and Construction

Abstract: In this article, as a result of the study of the physical and chemical properties of industrial wastewater, it is necessary to develop the theoretical basis of the processing system for cleaning and softening the mechanical impurities in industrial wastewater. Extraction, processing, and industrialization of floating and dissolved organic compounds in wastewater produced by the production enterprise of "MEKHMASh" LLC. Based on the proposed technological scheme for the wastewater of the enterprise, the optimal technology of the treatment process is discussed. In addition, the introduction of processed organic compounds into industrial production will greatly benefit the industrial economy and prevent harm to the ecology, animal world, human health, and sewage. The recycled organics have been tested, and the production process for industry has been established.

Keywords: Wastewater, "MEKHMASh" LLC, wastewater, phosphating, degreasing, dispersed systems, cleaning, polluting component, organic compounds, oils, grease, milk of lime.

Аннотация: В данной статье в результате изучения физико-химических свойств промышленных сточных вод необходимо разработать теоретические основы системы обработки для очистки и умягчения механических примесей в промышленных сточных водах. Извлечение, переработка и индустриализация плавающих и растворенных органических соединений в сточных водах, производимых производственным предприятием ООО "Мехмаш". На основе предложенной технологической схемы для сточных вод предприятия обсуждается оптимальная технология процесса очистки. Кроме того, внедрение переработанных органических соединений в промышленное производство принесет большую пользу промышленной экономике и предотвратит нанесение вреда экологии, животному миру, здоровью людей и сточным водам. Переработанная органика была протестирована, и был налажен производственный процесс для промышленности.

Ключевые слова: Сточные воды, ООО "Мехмаш", сточные воды, фосфатирование, обезжиривание, дисперсные системы, очистка,

ISSN 3030-3907

загрязняющий компонент, органические соединения, масла, жиры, известковое молоко.

Annotatsiya: ushbu maqolada sanoat oqava suvlarining fizik-kimyoviy xususiyatlarini o'rganish natijasida sanoat oqava suvlaridagi mexanik ta'sirlarni tozalash va yumshatish uchun qayta ishlash tizimining nazariy asoslarini ishlab chiqish kerak. "Mexmash" MCHJ ishlab chiqarish korxonasi tomonidan ishlab chiqarilgan oqava suvlarda suzuvchi va erigan organik birikmalarni qazib olish, qayta ishlash va sanoatlashtirish. Korxonaning oqava suvlari uchun tavsiya etilgan texnik sxema asosida tozalash jarayonining maqbul texnologiyasi muhokama qilinadi. Bundan tashqari, qayta ishlangan organik birikmalarning sanoat ishlab chiqarishiga kiritilishi sanoat iqtisodiyotiga katta foyda keltiradi va ekologiya, hayvonot dunyosi, inson salomatligi va kanalizatsiyaga zarar etkazilishining oldini oladi. Qayta ishlangan organik moddalar sinovdan o'tkazildi va sanoat uchun ishlab chiqarish jarayoni yo'lga qo'yildi.

Kalit so'zlar: oqava suvlar, "Mexmash" MCHJ, oqava suvlar, fosfatlash, yog'sizlantirish, dispers tizimlar, tozalash, ifloslantiruvchi komponentlar, organik birikmalar, moylar, surtmalar, ohak suti.

Introduction.

The introduction of technology to purify industrial wastewater from production enterprises will greatly benefit the economy and the environment. Construction of water protection facilities and increasing the capacity of the water reuse system; better protection of water sources from construction or pollution in general; application of a non-polluting system of water use in enterprises; as well as the organization of an automated system of management of water management complexes; and full use of water resources in our country It is carried out by using them, protecting them from pollution from household and industrial wastes, and organizing the water purification process well. As can be seen from the above, to protect the environment and water bodies, it is necessary to thoroughly clean the wastewater before dumping it into the water bodies. In addition, production (industrial) wastewater is considered very toxic and rich in chemical (reagent) elements. For this reason, it is advisable to use a closed system in the processing of wastewater in production (industrial) enterprises [1-3].

Determination of the total hardness of water. 100 ml or less of the test water, diluted to 100 ml with distilled water, is placed in a conical flask. The total amount of calcium and magnesium ions in this volume of water should not exceed 0.5 mol. Then 5 ml of the obtained buffer solution is placed on top of this water, 5-7 drops of indicator or 0.1 g of dry sodium chloride mixed with eriochrome black-T are added, and the solution is immediately mixed with trilon B solution (0.05N) titrate

ISSN 3030-3907

until the color changes to blue-green. The blue-green color of the solution indicates that Ca^{2+} and Mg^{2+} ions are completely bound to trilon B; that is, there are no Ca^{2+} and Mg^{2+} ions in the solution. If more than 10 ml of the titrated 0.05N trilon B solution is consumed, this indicates that the total amount of calcium and magnesium ions in the obtained water is more than 0.5 mmol. In this case, it is necessary to repeat the determination by taking a smaller volume of water diluted to 100 ml with distilled water. A clear color change at the equivalence point indicates the presence of copper and zinc in the water. 1-2 ml of sodium sulfide solution is added to remove corrosive substances from the obtained sample. After that, the analysis is carried out in the order indicated above.

If, after adding the buffer solution and the indicator to the measured water, the color of the solution to be titrated slowly turns gray to gray, this indicates the presence of manganese. In this case, 5 drops of 1% $(NH_2OH)_2*H_2SO_4$ are first added to the water taken for analysis, and then the hardness of the water is determined. If a stable and clear color is not formed at the equivalence point of the titration, this indicates that the water is highly alkaline. In this case, the sample taken with a 0.1N HCl solution is neutralized and then boiled. After that, the hardness of the water is determined by adding a buffer solution and an indicator. [4,5]

When we checked the hardness level of the artesian water coming into the production process, we saw that it was between 21 mg/l and 27 mg/l. Therefore, it can be concluded that the hardness level of the water supplied to the production is very high, but this has no effect on the production, so much attention is not paid to softening the first incoming clean artesian water. We can see that the level of hardness of the wastewater produced by the production has decreased to 10.46 mg/l. Because of this, the hardness of the water is reduced with the help of NaOH and Na_3PO_4 compounds, which are used in the galvanic process for production, that is, to clean the surface of metals.[6]

The total hardness of water is determined by the following formula:

$$Q_{com}=V_1 \cdot 0.05 \cdot K \cdot 1000/V_2$$

V_1- the volume of trilon B solution spent in titration, ml;

K- correction factor for the normal concentration of trilon B solution;

V_2- the volume of water taken to determine the total hardness, ml;

Relative errors in parallel analyses in determining the total hardness of water should not exceed 2%. [7-9].

ISSN 3030-3907

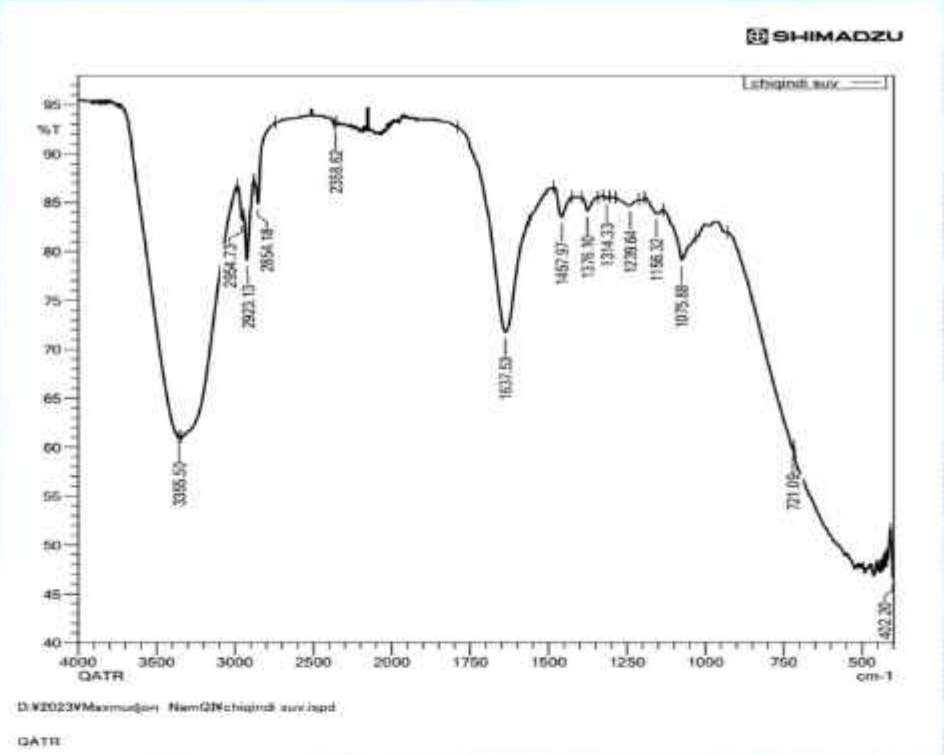


Figure 1. The composition of wastewater using the IR spectrum:

When industrial wastewater is examined using an IR spectrometer, we can see the presence of compounds in the wastewater [10]. At 3350.50, nitrates are very high in the wastewater, 2923 P_2O_5, and organic compounds and sodium are high. In addition, during the chemical treatment of the metal surface, it is evident that the concentration of nitrate and medium phosphoric acid salts and complex compounds combined with iron is very high in the solution environment. The composition of industrial wastewater and the degree of ecological and environmental impact were studied, according to which calcium and magnesium were determined by the complexometric method.[11-14] This method is based on the change in the color of the indicator due to the interaction of calcium and magnesium ions with Trilon B. Sodium is determined by the flame photometric method. Sulfates are determined gravimetrically. In this method, sulfates are precipitated with barium chloride in an acidic medium, and then the precipitate is washed and weighed. Chlorine is determined by the volumetric argonometric method. In this method, the interaction of silver ions with potassium bichromate is based on the change in the color of the precipitated silver chloride suspension. Accordingly, the initial composition of wastewater is as follows: In the technology under development, the primary raw material is a mixture of washed wastewater and recycled electrolytes. The physicochemical description of wastewater is given in Table 1.

ISSN 3030-3907

Table 1

Physico-chemical description of wastewater (m^3/gr)

Indicators	Production wastewater
Volume m^3, hours	24,812
pH	2,7-3,5
Phosphates	720
Zinc	100
Iron (II)	133
Iron (III)	1172
Chlorides	450
Titanium oxide	9,5
Nitrates	140
Organic compounds (oils)	250-300

Table 1 shows the general composition of industrial wastewater. The pH of the water is around 2.7–3.5, i.e., it is acidic due to the acid used in the process: phosphates 720 m^3/g, zinc 100 m^3/g, iron (II) and (III) 1305 m^3/g, chlorides 450 m^3/g, titanium oxide 9.5 m^3/g, nitrates 140 m^3/g, and organic compounds (oils) 250–300 m^3/g. serves to ensure that it does not As we know, as a result of the transition of chemical compounds to each other, another substance is formed as a result of a chemical reaction, and as a result, an error in the process, i.e., the process stops.

Results and Discussion. Disposing of industrial wastewater into open water bodies requires compliance with sanitary rules and regulations. In this regard, before dumping industrial waste water, it is necessary to use several treatment methods to pass industrial waste water from treatment methods that do not adversely affect the sanitary conditions of the water basin.

Waste water treatment facilities directly depend on the composition of waste water generated during the production process. Based on the information given above, it is aimed at cleaning the waste water from unnecessary additives, as well as chemicals that can harm the nature and animal world.

In the production enterprise of "MEXMASh" LLC, located in Namangan region, chemical treatment is carried out in order to increase the corrosion resistance of metal surfaces (phosphatirovaniya, zinkovaniya). The recommended laboratory device was developed in order to clean the industrial waste water generated in this process and to carry out test processes in production.

An experimental test device for cleaning circulating water from chemical and mechanical impurities and returning it to technology was installed.

ISSN 3030-3907

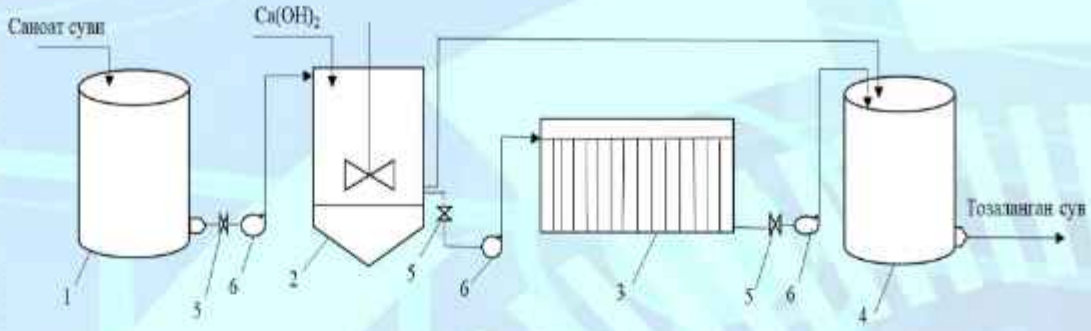


Figure 2. Technological scheme of wastewater treatment

- fig. Returning the purified water to the technological process after purifying the waste water from organic compounds will prevent harmful waste to the environment and bring economic benefits for the industry. After coming to the industrial waste water treatment unit, in the waste water collection 1 hopper, the sedimentable substances settle to the bottom of the tank (waste water collector) and a certain purity is achieved. Dissolved substances remaining in the solution are taken to mixer 2, in this process it is very important that the pH of the effluent is accurate. The size of the mixer is selected based on the amount of waste water generated during production. 1-1.5% of the 5-7% Ca(OH)2 solution is added to the waste water falling into the mixer and mixed thoroughly. Then the mixture is left to rest for half an hour. The pH of the purified water in the upper part is determined, and the pure water is fed to the 4th section, and 1/3 of the total solution is fed to the filter press 3. The pH value of purified water should be around 6.5-8.5, since we use alkali (Ca(OH)2) in the purification process, the pH is almost 7. If the pH is higher than -8.5, it is lowered using hydrochloric acid solution in the pH corrector. During the cleaning process, water flows from the pipes to the next process.

Supporting materials:

- Alkalizing reagent CaO (GOST 9179-77), a solution with a concentration of 5% in terms of the active part, is sent as a solution. Consumption of a 5% solution: 0.25 m^3/h. Consumption of 100% CaO: 12.5 kg/h to 75.6 t/year. Synthetic technical hydrochloric acid; hydrogen chloride not less than 31.5% by mass; GOST 857-95. It will be developed at the "NAVOIYAZOT" JSC enterprise. A solution with a volume concentration of 0.5% is transmitted visually. The consumption of the solution is determined according to the pH meter. Approximate consumption: 0.75 l/hour. A physico-mechanical description of purified water is given in Table 2.

ISSN 3030-3907

Table. 2

Physico-mechanical description of treated water (m^3/gr)

Indicators	Production wastewater
Volume m^3, hours	24,5
pH	8,5
Phosphates	2,0
Zinc	1,0
Iron (II) and (III)	0,3
Chlorides	25
Titanium oxide	-
Nitrates	0,16
Organic compounds (oils)	0,1

Based on the information given in Table 2, the pH is always controlled, and its upper limit is ensured not to exceed 8.5 and not to fall below 6.5. Phosphates 2.0 g, zinc 1.0 g, iron (II), and (III) 0.3 g of heavy metals, the amount remaining in the purified technical water does not harm production. It can be seen that nitrates and organic compounds are completely purified and do not cause harm in production. Chlorides are around 25 because we use HCl to correct the pH during the cleaning process, which is certainly not harmful in production.

In the technological scheme presented in Figure 2, the process of returning purified technical water to full production and technology is provided. In this technological scheme, device 6 performs the task of extracting floating oils from wastewater and reducing the hardness of the water. Separated oil and softened wastewater are sent to the recycling process. Depending on technical water requirements, water softening can be reduced to 7 mg eq/dm^3 or more.

In the process of heat treatment, the raw material is saturated with carbon and sent to the distribution section. During this process, the carbon structure is preserved due to the sharp cooling of the raw material. We use I-20 oil in the cooling process. When the raw material is immersed in oil and sent to the next process, the metal surface comes out with oil. Before entering the carbon distribution section, it is washed with water at a temperature of 60–70 °C and sent to the water treatment section.

ISSN 3030-3907

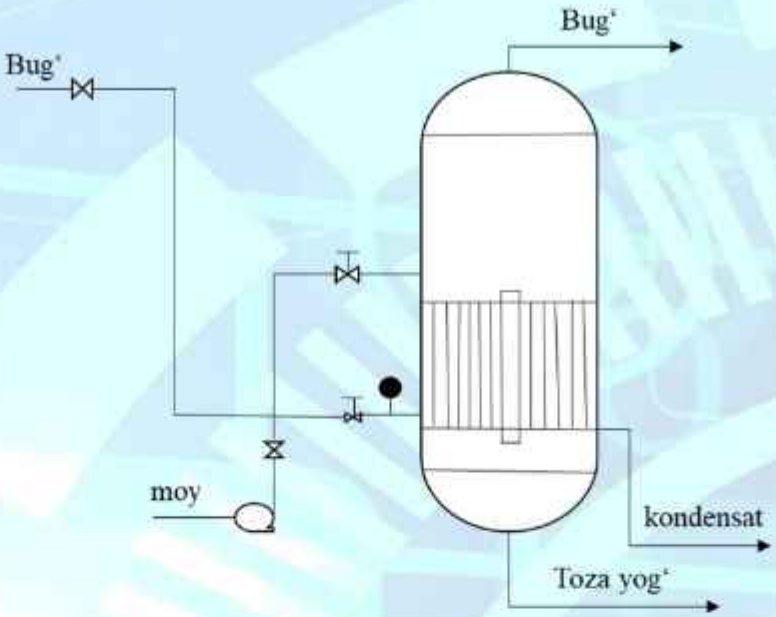


Figure 3. Oil vaporizer

As we know, due to the low viscosity of oil, water, and oil separate by themselves, and they are left in the clarifier for 2–3 hours. During this period, the oil is completely separated into water and oil, and the resulting water is sent to the treatment plant. The organic compounds in the oil are first dehydrated by centrifugation; as a result, 15-20% moisture remains in the oil. In Figure 3.4.2, it is supplied to the heat exchanger (evaporation) section to reduce the humidity. In this process, steam is supplied to the tubes of the heat exchanger unit at 140 °C. In the device, the amount of heat is averaged at 100–110 °C, and the purified oil is returned to production. Based on the production capacity, an average of 750 liters of oil are produced per day, and 20–21 tons of oil are consumed per month. Organic compounds (oil) were processed and produced based on the proposed technology, and the intended goal was achieved.

ISSN 3030-3907

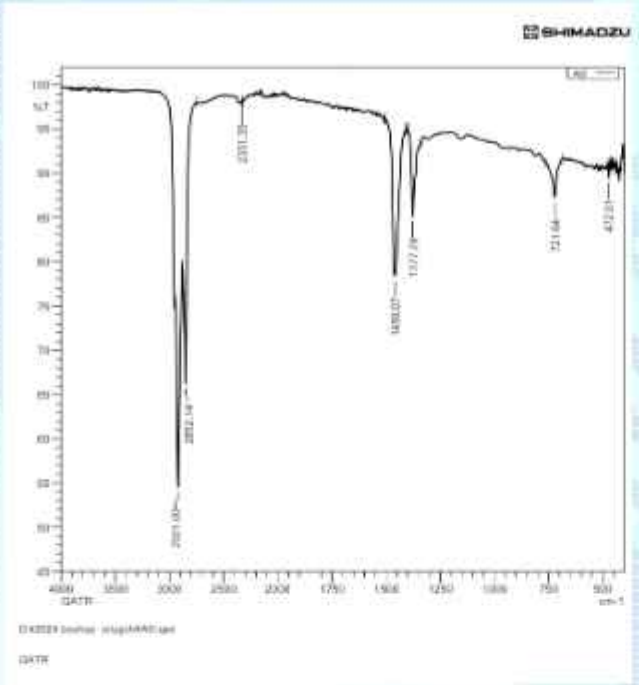


Figure 4. The composition of the oil extracted as a result of thermal processing

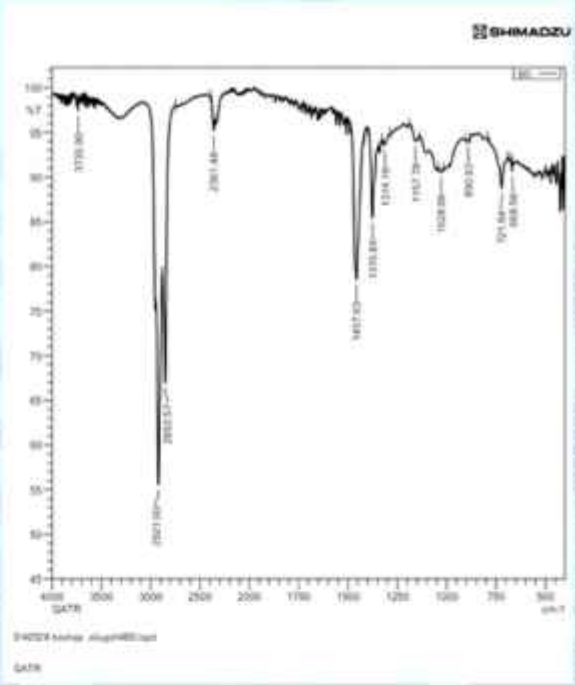


Figure 5. The purified composition of the oil separated from the waste water of the thermal processing unit.

Figure 4 shows the results and composition of the oil used for the process of rapid cooling of metals during heat treatment. The data presented in pictures 5 are the composition of the oil extracted from the oil separated by washing before reprocessing in the cooling section during thermal treatment. Figures 4 and 5 show that the results of both processes are almost identical in terms of content.

Currently, the oil processing enterprise has been tested in five thermal processing furnaces; as a result, the technology of processing an average of 16–17 tons of oil per month has been established. It covers 80% of total production costs and brings significant benefits to the economy of the enterprise. It should be noted here that the quality indicators of processed oil are good, and no negative effects occur during the production process. Oil processing precipitates and NaOH-extracted oil extracts have been tested in a soap factory, with positive results so far.

Conclusion. Currently, it is considered appropriate to organize production based on waste-free technology and to develop circulating water technology for cleaning and reusing wastewater, taking into account the demand for drinking water. In addition, we will prevent air pollution from damaging the soil and plants. Purification of industrial water from oil and oil products, as well as separation of organic compounds and providing it for industry, is economically beneficial for large-scale production. In addition, the organic compounds contained in

ISSN 3030-3907

wastewater are considered very dangerous for the ecology of cultivated fields, so it is very important not to clean organic compounds and throw them away as waste but to apply them to production. The test results of oil cleaned and processed as a result of cleaning and processing technology instead of oils used for cooling purposes in the thermal treatment department of the industry were studied, and a positive result was obtained.

REFERENCES

1. Mirsaidov, M., Nimchik, A., Khodjiyev, O., Jesfar, M., Zokirov, K., Shamatov, S., ... & Kambarov, A. (2024). Analysing the chemical standards of the Fergana Mekhmash wastewater treatment plant and environmental processing. In E3S Web of Conferences (Vol. 498, p. 02016). EDP Sciences.

2. Xurmamatov, A. M., Mirsaidov, M. X., & Dedaboyeva, M. N. (2024). SANOAT SUVLARINI TOZALASH USULLARINI TAKOMILLASHTIRISH. Экономика и социум, (1 (116)), 240-246.

3. Xabibullayevich, M. M. (2023). SANOAT CHIQINDI SUVLARNI QAYTA ISHLASH SISTEMASI. Journal of new century innovations, 38(2), 101-108.

4. Dadakhojhaev, A., Xamrakulov, M. A., Mirsaidov, M., & Abdulakimov, A. (2023). INCREASING IN FERTILITY, MELIORATIVE STATE OF SALINE SOILS DUE TO THE ORDER OF PRIORITY. SEEDING OF AGRICULTURAL CROPS. Journal of new century innovations, 38(2), 96-100.

5. Haydarov, B., Mirsaidov, M., Ibodullayeva, G., Ergasheva, S., & Bekbotayeva, M. (2023). INDUSTRIAL WASTEWATER RECYCLING SYSTEM. Science and innovation, 2(A3), 265-271. \

6. O‘G‘Li, H. B. H., Xabibullaevich, M. M., Qarshiboevna, E. M., & O‘G‘Li, D. M. K. (2023). NEFT VA GAZNING KIMYOVIY TARKIBI. Yosh mutaxassislar, 1(03), 53-57.

7. Maxmudjon, M., Numonjonovna, D. M., & Abdumutal o‘g’li, A. A. (2023). KALSIY VA AMMONIY NITRATLARNI ETANOL ISHTIROKIDA EKSTRAKTSIYALASHNI TADQIQ QILISH. PEDAGOG, 6(11), 230-236.

8. Xabibullayevich, M. M., Numonjonovna, D. M., & Abdumutal o‘g’li, A. A. (2023). OHAKTOSH ASOSIDA KALSIY NITRAT ISHLAB CHIQARISH XOSSALARI VA TEXNOLOGIYASI. PEDAGOG, 6(11), 225-229.

ISSN 3030-3907