Neo Science Peer Reviewed Journal
Volume 3, Nov. 2022 ISSN (E): 2949-7701
www.neojournals.com

Non-Ferrous Metals and Their Alloys New Innovative Technologies in Production of Non-Ferrous Metals

Niyozov Sobir Ahror o'g'li
Bukhara Engineering and Technology Institute, Uzbekistan
sobirniyozov1991@gmail.com

Fatilloyev Shamshod Fayzullo o'g'li
Bukhara Engineering and Technology Institute, Uzbekistan

Bafoev Abduhamid Hoshim o'g'li
Bukhara Engineering and Technology Institute,Uzbekistan, Master student

Abstract:

It should be noted separately that among the copper ores used in industry, natural ores (containing 99.9% copper) are used very little, and this accounts for 5% of the world's copper wealth. Copper sulfide compounds (ores) are the most common and account for about 80% of the world's reserves. The most common of these ores is chalcopyrite CuFeS2, followed by chalcocite Cu2S, bornite Cu3FeS3 and covelite CuS. Copper oxide ores make up about 15% of the world's reserves. Its representatives are malachite CuCO3*Cu(OH)2, cuprite Cu2O, tenorite (melaconite) CuO, azurite 2CuSO3 Cu(OH)2 and others. In ores used in industry, the amount of copper is 1-2%, poor ores on average 0.5%, the richest ores 3% or more.

Keywords:

chalcopyrite, bornite, covelite, chalcocite, tenorite (melakonite), cuprite, azurite, copper content is 1-2%, poor ores average 0.5%, richest ores 3%, copper sulfide, oxidation and various gases.

Improving the procedure for working with scrap and waste of non-ferrous and ferrous metals with the involvement of secondary resources of scrap and waste of non-ferrous and ferrous metals generated in the course of economic activity of the economy of the republic and the life of the population for the production of products with high added value in order to ensure its rational use The Cabinet of Ministers decides:

1. On the territory of the Republic of Uzbekistan[26]:

In accordance with the Decree of the President of the Republic of Uzbekistan on measures to further improve the management system of Uzmetkombinat JSC dated September 15, 2017 No.;

In accordance with Decree No. 849 of October 18, 2017 of the Cabinet of Ministers of the Republic of Uzbekistan "On measures to improve the system for collecting, transferring and processing scrap and non-ferrous metal waste", the preparation of non-scrap and ferrous metal waste is carried out only by Uzikkilamchiranglimetall JSC;

In accordance with the Decree of the President of the Republic of Uzbekistan No. PF-2559 dated March 4, 2000 "On measures to prevent theft and illegal export of scrap and waste of non-ferrous metals", taking into account the changes introduced by Decree No. PF-5300 dated January 12, 2018 JSC "Uzykkilamchiranglimetall" and its entities accept from individuals scrap non-ferrous household waste, including tools and equipment

intended for use, as well as Reception of scrap and non-ferrous metal waste through a special reception points on the list approved by government decree must be taken into account.
2.Following:
Regulations on the procedure for handling scrap and waste of non-ferrous and ferrous metals in accordance with Appendix 1;
The list of scrap and waste of non-ferrous metals for domestic purposes, allowed to be accepted from individuals, is approved in accordance with Appendix 2.
3. JSC "Uzikkilamchiranglimetal" to organize within two months in the cities and regional centers of the Republic of Karakalpakstan and regions of the republic points of acceptance of scrap and waste of non-ferrous metals, specified in Annex 2 to this decision, from individuals.
4. It should be noted that from January 1, 2019, organizations, with the exception of organizations that have their own foundry and metal-rolling production (except in cases of bankruptcy and liquidation), organizations that have their own foundry and metal-rolling production (except for cases of bankruptcy and liquidation) , bankruptcy, liquidation, reconstruction and modernization of natural and obsolete equipment containing non-ferrous and ferrous metals, decommissioned in the prescribed manner, must be handed over to “Uzmetkombinat” AJ and “Uzykkilamchiranglimetall” JSC. JSC at a free (contractual) price.
Non-ferrous metals and their alloys are of great importance in carrying out the scientific and technological revolution in the further development of the national economy of our country. Because these structural materials are widely used in various sectors of the national economy, for example, in the aviation industry, rocket science, electrical engineering, radio engineering, etc[1,2 and 3].
The main representatives of non-ferrous metals are gold, silver, platinum, zinc, copper, titanium, nickel, magnesium, aluminum, lead, tin, chromium, tungsten, vanadium, cobalt, molybdenum, niobium, zirconium, lanthanum and others.
In the Middle Ages, only a few non-ferrous metals were produced: copper, lead and zinc in very small quantities. The main and most necessary non-ferrous metals: nickel, chromium, aluminum, tungsten, tin and others were brought from abroad. For this, new industrial enterprises were created and developed on the basis of new technological processes that make it possible to quickly obtain non-ferrous metals. Such industrial enterprises were created not only in the central cities, but also in many other cities of the Union republics[4,7 and 9].
In such industries, the corresponding ores began to be processed for the production of non-ferrous metals. At present, our country has large reserves of such ores and occupies one of the highest places in the world in terms of reserves of various non-ferrous metal ores.
Copper and its alloys
Kopper D. Ya. A chemical element belonging to the I group of the periodic system of Mendeleev. Serial number 29, atomic weight 63,546. Natural copper consists of two

stable isotopes (65 Cu 69.1%) and Cu (30.9%).Artificial radioactive isotopes 61 Cu and 64 Cu are considered important from a practical point of view.

Copper is one of the non-ferrous metals known to mankind since ancient times, and its alloys were of great importance in the development of the material culture of human society. In 1976, a copper ingot weighing about 200 kg was found in a coastal quarry near the Onega ash tree. This pure copper is stored in the archaeological museum of the Institute of History, Literature and Language of the Karelian branch of the FA. Copper ores. Pure copper is rarely found in nature, its ores are mainly divided into two main groups[5,6,8 and 10]:

1. Sulfides, minerals, in their composition combined with copper, S;
2. Oxide compounds, which include copper oxides.

It should be noted separately that among the copper ores used in industry, natural ores (containing 99.9% copper) are used very little, and this accounts for 5% of the world's copper wealth. Copper sulfide compounds (ores) are the most common and account for about 80% of the world's reserves[11]. The most common of these ores is chalcopyrite $CuFeS_2$, followed by chalcocite Cu_2S, bornite Cu_3FeS_3 and covelite CuS.

Copper oxide ores make up about 15% of the world's reserves. Its representatives are malachite $CuCO_3$*$Cu(OH)_2$, cuprite Cu_2O, tenorite (melaconite) CuO, azurite 2CuSO3 Cu(OH)2 and others. In ores used in industry, the amount of copper is 1-2%, poor ores on average 0.5%, the richest ores 3% or more[12,14,15 and 16].

counts. On an industrial scale, poor ores are enriched in a natural way. Inertial rocks in copper ores include sand, siltstone, limestone, quartz, barite, calcium, and various aluminosilicates[13 and 18].

However, the types and quantities of substances in ores mined in different places, as well as in different rocks (components) can be different. The places of extraction of copper ores in the country are mainly the South Urals, Kozogistan, Transcaucasia. Uzbekistan, Tajikistan and Taimyr. For example, ore mined in the city of Almalyk, Uzbekistan, contains quartz, feldspar, sericite, anhydride, pyrite, molybdenum.

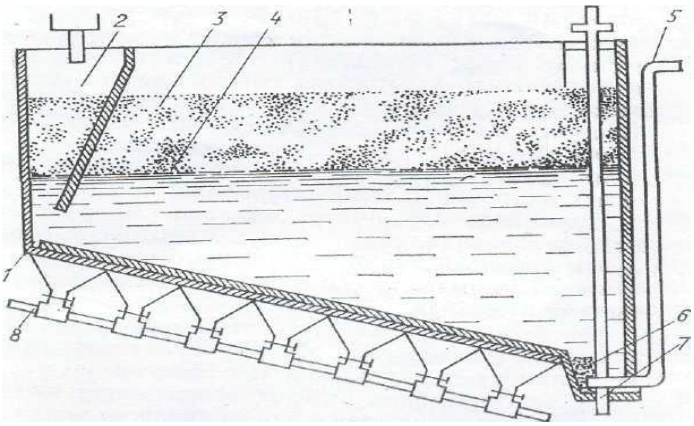

Fig 1. 1 - the bottom of the fabric; 2 - bunker; 3 - laughter; 4 - kushi; extraction hole; 5 - water pipe; 6- hole for removing idle stones; 7 - single breeds; 8 - for air there are tubular, denitic, magnetite, chalcopyrite, covelin and other compounds.

Process for enrichment of copper ore. To enrich copper ores in order to separate the unnecessary substances (waste) contained in them, the corresponding ore is enriched by the flotation method to obtain copper concentrates[17 and 19].

Flotation operations are carried out using flotation machines. To do this, the processed ore is pre-ground in a ball mill (the grain size is adjusted to 0.05-0.5 mm). The oily synthetic is then melted and mixed with crushed ore, resulting in the formation of an oily film on the surface of the copper sulfide, which allows Cu2S to be separated from various waste products[20,21 and 23].

Thus, the prepared ore gets from the bunker into the water-filled chamber (2) of the flotation machine (Fig. 1). The machine is continuously supplied with air through the pipe (8), and this air enters the bath through the hole (1) in the bottom[22 and 24].

As a result, air bubbles stick to slightly ashed ore scales and carry them to the surface of the bath cavity in the form of a foam layer (3), which is removed by a rod (4) and then dried. The result is a concentrate containing 15-20% copper[25].

Particles of additional mixtures are well saturated with water and settle to the bottom of the machine (7), this sediment is removed through the hole (6) and so on.

Currently, up to 80% of all copper is extracted from ore by pyrometallurgical means, i.e., it is extracted from copper sulfide concentrate (the ore is pre-enriched by flotation) by smelting. About 20% of copper is extracted from various ores by the hydrometallurgical method, that is, the necessary ore is processed with various solutions, or extracted by chemical methods.There are many ways to get copper on an industrial scale. In the pyrometallurgical method, the corresponding ores for the extraction of copper are smelted in furnaces of various designs (flame, electric, mine, converter, etc.). The technology for extracting copper from sulfide ores by this method is a simplified schematic representation of the technological process for obtaining copper by the pyrometallurgical method.

Figure.1 As can be seen from the figure, copper mining consists of many technological processes. To do this, the necessary ore is enriched, then the boiled concentrate is melted in a furnace and liquid matte is obtained (an alloy of FeS with Cu_2S.). The matte contains 20-50% Si, 20-40% Fe, 22-25% S, oxygen and additional elements Au, Ag, Pb, Zn, etc. are close to 8%. As a result, the resulting liquid clay is desalted in special converters with a diameter of 2.3-4 m and a length of 4.3-10 m (such converters are capable of producing up to 100 tons of copper in one cycle) (when the matte is poor in copper for 10-12 hours, two during the day), raw copper is obtained. Upon receipt of blister copper from the crucible in the converter, chemical reactions occur in soot, that is, air with a pressure of 80-120 kPa is supplied to the liquid crucible and the quartz flux is cooled, in which $FeSK1.5O_2$ is mixed with iron oxide. flux from $FeOKSO_2$ and turns into slag, i.e.: $2FeOKCuO_2$ is Fe_2CuO_4, and the resulting converter The slag is burned in vats and transported to fiery furnaces, the necessary substances or elements contained in it are extracted.

As a result, almost pure copper sulfide (Cu_2S) (Si content 80%) is formed in the converter, copper sulfide is oxidized to obtain black stains, i.e.: Si_2O in Cu_2S Ql, $5O_2$

Cu_2O Q SO_2 reacts with pure copper sulfide (Cu_2S) or whites to form pure copper, i.e.: $2Cu_2O$ Q Cu_2S 6Cu Q SO_2

It is necessary to maintain the temperature in the converter (1250-1350°C) within certain limits for the oxidation of S and Fe as a result of chemical reactions, etc. waste oxidation and removal together with various gases, smelting.

The electrolytic refining operation is carried out to obtain even purer copper (99.99% and above) from the resulting crude copper solution.

As a result of electrolytic refining, gold, silver, selenium, tellurium and other precious elements contained in high-purity copper and ore for the electrical industry are isolated. Because such precious elements are almost always present in the copper in the converter. Currently, about 25% of the copper produced in our country is obtained by this method of electrolytic refining.

In electrolytic refining, copper is used in the anodil form (roasted after the iron refining process). As a result, the anode plates are immersed in a bath filled with a solution of copper sulfate in water, sulfuric acid (about 200 g l), that is, an electrolyte, and connected to the positive pole of the current source.Plates of pure copper with a thickness of 0.6-0.7 mm are hung with a special copper rod (shturgen) on copper anodes immersed in an electrolyte in a bath, and connected to the negative pole of an electric current source.

As a result (after the current source is fully connected), the copper in the corresponding anode separates and sticks to the cathodes, forming a dense layer on the rod. The temperature of the electrolyte in the bath is in the range of 50-55°C. Some substances in the mixture (zinc, nickel, iron, etc.) dissolve in the anode and mix with the electrolyte, polluting it (changing transparency).

Other insoluble compounds (silver, gold, selenium, tellurium) are crushed into small flakes and collected at the bottom of the bath. The mass collected at the bottom of the bath is slowly removed from the bath and the precious non-ferrous metals contained in it are separated from it. Such a process is very cheap, i.e. the cost of this process is even less than the amount of rare metals formed at the bottom of the bath.

The average number of particles formed at the bottom of the bath is 0.2-0.5% by weight of the anode.

The current density required for electrolytic refining is 100-200 A per 1 m2 of cathodes, the voltage is 0.3-0.35 V.

The time of separation of the substance from the anodes in the bath is 20-30 days. The replacement of cathodes is carried out every 7-15 days, 700-1100 MJ of electricity is spent to obtain 1 ton of cathode copper.

As a result, the extracted copper cathodes are washed and remelted in electric furnaces, flame furnaces, the necessary billets for rolling are heated, and, if necessary, various copper alloys (MOO, M4, etc.)

The types of such copper alloys and their chemical composition (in%) are given in Table. 5.

Copper alloys are divided into two groups: the brass group and the bronze group.

The brass group refers to alloys consisting of copper and zinc. Sometimes such brasses (alloys) are called brass. The amount of zinc in technical brass reaches 48-50%.

According to GOST 15527-70, there are six varieties (marks) of copper-zinc brass - L96, L90, L85, L80, L70, L68, L62. The meaning of this marking is that the letter L indicates the name of the brass and alloy, and the numbers indicate the copper content in the alloy. Special (complex) brass alloys, i.e. copper and elements other than zinc (as an alloying agent), are marked with letters and numbers indicating the corresponding elements. for example, HP 74-3, LO 70-I, LAN 59-3-2, LMC 58-2, etc. The first number on the stamps indicates the average amount of copper, and the subsequent numbers indicate the average amount of the corresponding elements in%.Accordingly, the first letters of the Russian names of the main alloying elements added to brass are expressed; tin-O, zinc-Ts, lead-S, iron-J, manganese-Mts, nickel-11, silicon-K, aluminum-A, etc. For example, from special brass alloys grade LMts 58-2 (grade) Mts indicates for the amount of manganese, 58 - for the amount of copper, 2 - for the amount of manganese.

If a brass die has an L on the end, it means it is cast brass, such as LK 80-ZL, LAJ £0-1-1L, etc. Brasses that do not have an L on the die end are wrought brasses.

Cast brass is used to make various fittings, taps, mixers, bearing bushings, anti-corrosion parts, etc. for sanitary systems.

Radiator pipes, corrugated pipes, straight pipes and others are made of deformable brass.

Bronze Troupe. In various fields of technology, copper alloys with almost all metals (except zinc and nickel), which are called bronzes, are widely used. As a result, such bronzes have very good combustibility and antifriction properties, and are resistant to corrosion. The main products (dsteel) of bronze are made by casting, pressing and cutting. Bronzes are divided into tin, lead and other components.

Bronze is marked with the letters Br. On the right side of Br, the elements that make up bronze are written, and the corresponding elements are marked with numbers showing their average amount in%. For example, the brand Br ONS 11-4-3 indicates that bronze contains 11% cal, 4% nickel, 3% lead and copper (numbers indicating the amount of copper in% are not written on the bronze brand).

Since tin is an expensive and rare component of tin bronzes, the composition of such bronzes has been changed and bronzes of other grades are produced. These bronzes include aluminum bronze Br A5 and very complex aluminum ferromanganese bronze Br LZh Mts 10-3-1.5 and others.

Tin bronzes (consisting of copper and tin) have been known to mankind since ancient times. However, an increase in the amount of tin in the composition of such bronzes is not advisable, since the plasticity and stickiness of the bronzes decrease, and their brittleness increases. Therefore, bronzes containing more than 14% tin are practically not used.

Therefore, cast bronzes can be single-phase (A) and two-phase (A Q 6) depending on the amount of tin in the composition.

To improve the properties of tin bronzes, alloying elements are added to them. For example: alloying elements Ni, Zn, P to improve the mechanical properties of bronzes,

===

Pb, Zn to improve the technological properties, Ni to improve anti-fracture properties) Elements R, R, Ni are added to improve corrosion resistance.

According to the method of obtaining various products, bronzes are divided into deformable (single-phase) and foundry (two-phase). Various spring and spring materials are made from wrought bronzes, sliding bearings for special purposes (operating at high speeds and pressures), various fittings, highly heat-resistant and electrically conductive and corrosion-resistant parts, patterned and artistic castings are made from cast bronzes.In more recent times, due to the shortage of tin, other special types of bronze are developed, which are considered to be of higher quality compared to tin bronze due to their different properties and are widely used in various fields of technology.

Aluminum bronze (containing 5...11% A1) has high anti-corrosion and mechanical properties, but does not surpass tin bronze in terms of welding properties. This bronze is mainly used to make various gears, turbine parts, bushings, valve seats and hubs.

Silicon bronze (1..4% Cu) alloyed with nickel, manganese and zinc, is close to metal in its mechanical properties and is used to replace expensive tin and beryllium bronzes. Such bronzes are used for the manufacture of parts operating at temperatures up to 250°C.

Lead bronze (25..30% R) also has anti-friction properties, good cutting properties, good impact resistance and high tensile strength. Bearings of aircraft engines operated in high-speed conditions, diesel turbines and other parts are made from such bronzes.

I'm leaving here, dear. Beryllium bronze (up to 3% Be) is also used in various applications regardless of its composition. It is characterized by very high mechanical properties, bending resistance, corrosion resistance, high thermal and electrical conductivity (at a temperature of 500°C, their strength is equal to the strength of aluminum-bronze at 20°C).It is used in special parts that meet very high requirements: valves, diaphragms with elastic elements in fittings, sliding collars, springs, bells, gears, worm gears, bearings operating at high speeds and temperatures, etc.

Bronzes. br. denoted or marked with letters. After these letters, the letter expressions of the elements and their percentages are given. 4-4 (10%, 4%, Fe 4% Nt is copper). In addition, copper-nickel alloys are widely used. These are cupronickel, nickel silver, etc.

A representative of cupronickel is MP (19% Ni), which is characterized by high corrosive properties in organic acids and salt solutions in sea water. Also, due to its high plasticity, it is used in the manufacture of ships of the navy, small change coins, medical equipment, high-precision mechanical parts.

MNTs 15-20 (15% Ni Q SO, 20% Zn) - representatives of lower silvers (copper alloy, from 5 to 35% and from 13 to 45% Zn), which have high strength compared to cupronickel, corrosion-resistant, have a beautiful appearance . silvery color. Nisilbers are widely used for the manufacture of parts of various watch mechanisms, high-precision accessories and devices.

===

REFERENCES:

1 Bafoev, A. X., Rajabboev, A. I., Niyozov, S. A., Bakhshilloev, N. K., & Mahmudov, R. A. (2022). Significance And Classification of Mineral Fertilizers. Texas Journal of Engineering and Technology, 5, 1-5.

2 R.A. Makhmudov, K.Kh. Majidov, M.M. Usmanova, Sh.M. Ulashov, & S.A.Niyozov. (2021). Characteristics Of Catalpa Plant As Raw Material For Oil Extraction. The American Journal of Engineering and Technology, 3(03),70–75. https://doi.org/10.37547/tajet/Volume03Issue03-11

3 Hujakulova, D. J., Sh M. Ulashov, and D. K. Gulomova. "TECHNOLOGY OF DEODORIZATION OF SOYABEAN OIL." Galaxy International Interdisciplinary Research Journal 9.12 (2021): 171-174.

4 Shodiev Z. O., Shodiev S., Shodiev A. Z. THEORETICAL BASIS OF EFFECTIVE SEPARATION OF COTTON FROM AIR FLOW //Современные инструментальные системы, информационные технологии и инновации. – 2021. – С. 12-15.

5 Ниёзов , С., Шарипов, Ш., Бердиев, У. ., Махмудов , Р. ., & Шодиев , А. . (2022). ТРУЩИНЫ, ВЫПУСКАЮЩИЕСЯ ПРИ ПРОИЗВОДСТВЕ ХЛОРИДА КАЛИЯ ИЗ СИЛЬВИНИТОВОЙ РУДЫ. Journal of Integrated Education and Research, 1(4), 440–444. Retrieved from https://ojs.rmasav.com/index.php/ojs/article/view/302

6 Ниёзов С.А., Шарипов Ш.Ж., Бердиев У.Р., & Шодиев А.З. (2022). ВЛИЯНИЕ НИТРАТ И НИТРИТОВ НА ОРГАНИЗМ. Journal of Integrated Education and Research, 1(4), 409–411. Retrieved from https://ojs.rmasav.com/index.php/ojs/article/view/301

7 Amanovich, M. R., Obitovich, M. S., Rakhmatilloyevich, T. H., & Oybekovich, S. Z. (2021). The use of biological active additives (BAA) in the production of flour confectionery products. The American Journal of Engineering and Technology, 3(05), 134-138.

8 Mahmudov Rafik Amonovich, Shukrullayev Javohir Oybek ugli, Ereshboyev Husniddin Fazliddinovich, & Adizova Muqaddas Odil kizi. (2022). Improvement of Technology of Gypsum Production Raw Materials and Products in Production. Texas Journal of Multidisciplinary Studies, 6, 182–184. Retrieved from https://zienjournals.com/index.php/tjm/article/view/1059

9 Фатиллоев, Ш. Ф., Ш. Б. Мажидова, and Ч. К. Хайруллаев. "ВЛИЯНИЕ ДОБАВОК АЗОТНОКИСЛОТНОГО РАЗЛОЖЕНИЯ ФОСФОРИТОВ ЦЕНТРАЛЬНОГО КЫЗИЛКУМА НА ГИГРОСКОПИЧЕСКИЕ СВОЙСТВА АММИАЧНОЙ СЕЛИТРЫ." Gospodarka i Innowacje. 22 (2022): 553-556.

10 Kazakovich, Khayrullayev Chorikul, Fatilloyev Shamshod Fayzullo o'g'li, Dehkonova Nargiza, and Jabborova Aziza. "STUDY OF THE POSSIBILITY OF USE OF LOCAL PHOSPHORITES AND SEMI-PRODUCTS OF THE PRODUCTION OF COMPOUND FERTILIZERS AS ADDITIVE TO AMMONIA NITRETRE." EPRA International Journal of Research and Development (IJRD) 7, no. 4 (2022): 49-52.

11 Фатиллоев, Шамшод Файзулло Угли, Бехзод Мавлон Угли Аслонов, and Алишер Камилович Ниёзов. "ИЗУЧЕНИЕ МЕХАНИЧЕСКИХ СВОЙСТВ КОЖИ

ОБРАБОТАННЫМИ ПОЛИМЕРНЫМИ КОМПОЗИЦИЯМИ." Universum: технические науки 11-4 (80) (2020): 49-51.

12 Исматов С. Ш., Норова М. С., Ниёзов С. А. У. Технология рафинации. Отбелка хлопкового масла с местными адсорбентами //Вопросы науки и образования. – 2017. – №. 2 (3). – С. 27-28.

13 Narzullaeva, A. M., Khujakulov, K. R., Tursunova, D. H., & Teshaeva, M. S. (2020). Study of the Influence of the type of the catalyst on the technological process of hydration of higher fatty acids into alcohols, optimal parameters of the process, the industry of use of higher alcohols. International Journal of Advanced Research in Science, Engineering and Technology, 7(11), 15954-8.

14 Тешаева, М. Ш. К., Жураев, А. О., Исматов, С. Ш., & Камолова, З. М. К. (2018). Добавки для получения полимерных материалов и их переработки. Вопросы науки и образования, (1 (13)), 18-20.

15 Komilovna, H. M. U., Yormatova, D. Y., Tursunova, D. X., Kamolova, Z. M., & Teshayeva, M. S. (2021). Properties of the Soya Flour. Annals of the Romanian Society for Cell Biology, 9042-9046.

16 Камолова З. М. Қ. ЧАРМ МАҲСУЛОТЛАРИНИ ЁҒЛАШДА ҚЎЛЛАНИЛАДИГАН КОМПОЗИЦИЯЛАР ВА УЛАРНИНГ ТАҲЛИЛИ //Oriental renaissance: Innovative, educational, natural and social sciences. – 2022. – Т. 2. – №. 6. – С. 148-153.

17 Хужакулова, Д. Ж., & Мажидов, К. Х. (2019). Новые способы технологии дезодорации масел. ТЕХНИКА И ТЕХНОЛОГИЯ ПИЩЕВЫХ ПРОИЗВОДСТВ, 112.

18 Khujakulova D. J., Salimova Z. B. CHEMICAL INDUSTRY PRODUCTS TO INCREASE AGRICULTURAL PRODUCTIVITY AND PRODUCTION.

19 Shodiyev Z. O., Shodiyev A. Z. Mathematical modeling of the motion of a piece of cotton in a separator tube. – 2020.

20 Олтиев А. Т., Хайдарова М. Ф., & Бозорова Д. Н. (2022). ПЕРСПЕКТИВЫ ТЕХНОЛОГИИ ПРОИЗВОДСТВА ЦУКАТ. *Galaxy International Interdisciplinary Research Journal*, *10*(9), 279–284. Retrieved from https://www.giirj.com/index.php/giirj/article/view/2636

21 Haydarova, M. F. qizi, & Fatilloyev, S. F. o‘g‘li. (2022). SILIKAT MAHSULOTLARI TARKIBIGA KIRUVCHI KAOLINNI BOYITISHNING ENG SAMARALI USULLARI. *INTERNATIONAL CONFERENCES*, *1*(10), 3–6. Retrieved from http://erus.uz/index.php/cf/article/view/273

22 Худойбердиев Н. С., Ҳайдарова М. Ф. ПРОЦЕСС МОДИФИКАЦИИ ЖИДКОГО СТЕКЛА ПОЛИМЕРАМИ //Galaxy International Interdisciplinary Research Journal. – 2022. – Т. 10. – №. 10. – С. 39-41.

23 Ниёзов Собир Ахрор ўғли, & Раджаббоев Абдулазиз Илхом ўғли. (2022). Физико-химическая технология производства дефолианта хлората магния на основе местного сырья и вторичных продуктов. *E Conference Zone*, 26–32. Retrieved from https://www.econferencezone.org/index.php/ecz/article/view/1679

24 Ихтиярова, Г. А., Турабджанов, С. М., Рахмонов, Ш. Т., & Улашев, Ш. ИНТЕНСИФИКАЦИЯ ПРОЦЕССА КРАШЕНИЯ ШЕРСТИ С ИСПОЛЬЗОВАНИЕМ ХИТОЗАНА И СЕРИЦИНА. Узбекско-Казахский Симпозиум «Современные проблемы науки о полимерах» СБОРНИК ТЕЗИСОВ, 145.
25 Улашев, Ш. М., & Ихтиярова, Г. А. ИНТЕНСИФИКАЦИЯ ПРОЦЕССА КРАШЕНИЯ ШЕРСТИ С ИСПОЛЬЗОВАНИЕМ СЕРИЦИНА И ХИТОЗАНА. Узбекско-Казахский Симпозиум «Современные проблемы науки о полимерах» СБОРНИК ТЕЗИСОВ, 146..
26 https://lex.uz/uz/docs/3769620?ONDATE=05.04.2022