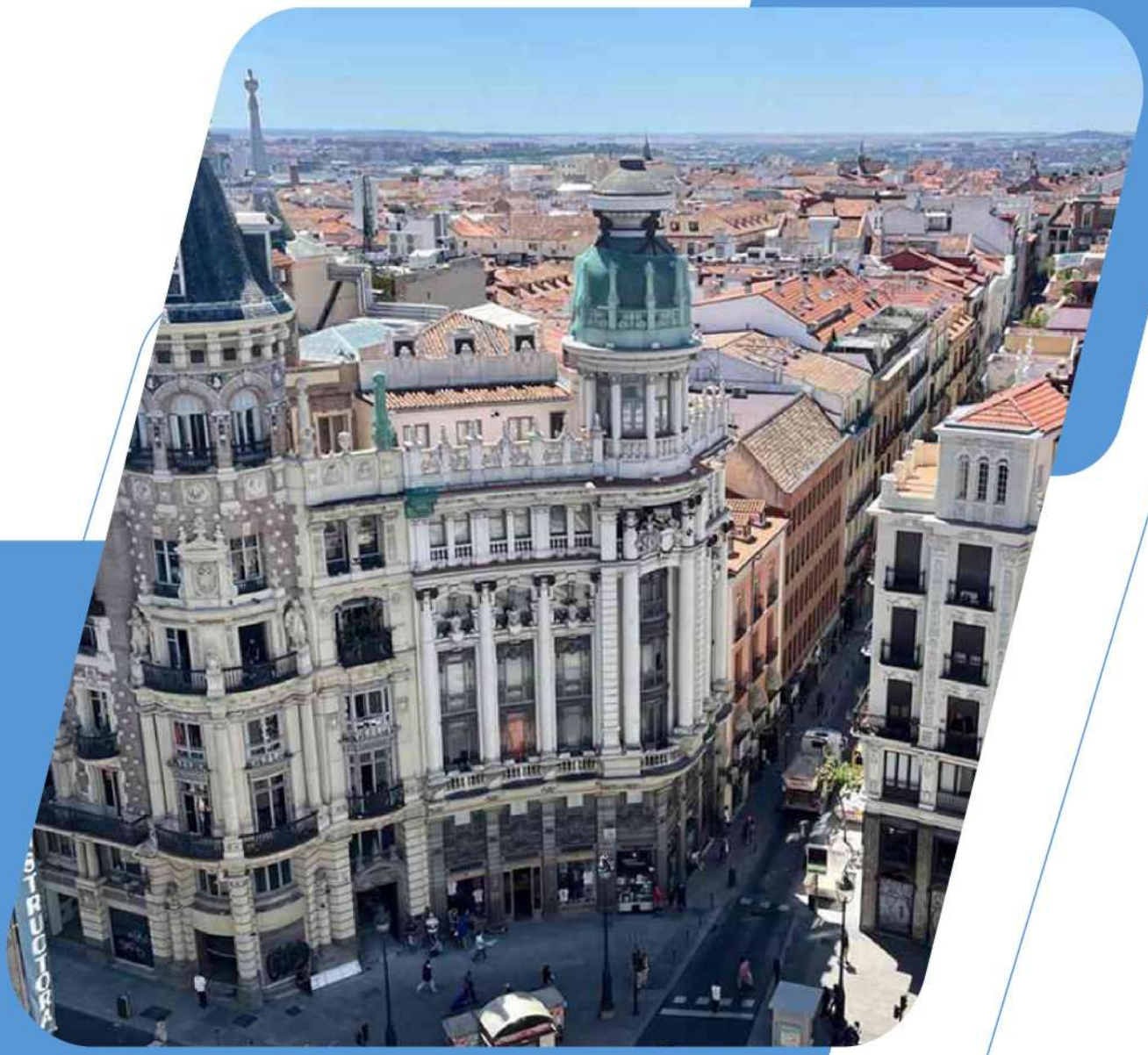
SC
scientific conferences



XIII international scientific conference
Madrid. Spain
23-24.07.2024

Scientific conferences

MODERN SCIENCE: THEORETICAL AND PRACTICAL VIEW

Proceedings of the XIII International Scientific and Practical Conference 23-24 July 2024

MADRID. SPAIN 2024

UDC 001.1
BBC 1

XIII International Scientific and Practical Conference «Modern science: theoretical and practical view», July 23-24, 2024, Madrid. Spain. 29 p.

ISBN 978-91-65423-71-8

DOI https://doi.org/10.5281/zenodo.13124742

Publisher: «SC. Scientific conferences»

Main organization: artmedia 24

Editor: Hans Muller
Layout: Ellen Schwimmer

The conference materials are in the public domain under the CC BY-NC 4.0 International license.
The publisher is not responsible for the materials published in the collection. All materials are provided in the author's edition and express the personal position of the participant of the conference.
All materials are published in the author's edition.
The conference organizers are not responsible for the content of the materials.

The sample of the citation for publication is Yusifov E.M., Niftaliyev V.R. CLUSTER AS A MODERN INSTRUMENT FOR INCREASING COMPETITIVENESS OF THE ECONOMY // XIII International Scientific and Practical Conference «Modern science: theoretical and practical view», July 23-24, 2024, Madrid. Spain. Pp.8-11, URL: https://sconferences.com

Contact information
Website: https://sconferences.com
E-mail: info@sconferences.com

Content

Biological sciences

IMPROVEMENT OF THE VEGETATIVE GROWTH OF RAPESEED (BRASSICA NAPUS L.) USING SYNTHETIC PLANT GROWTH REGULATORS AND MICROFERTILIZERS

Tsygankova V.A.
Dr. Biol. Sci., Principal researcher, Senior Staff Scientist
Andreev A.M.
Andrusevich Ya.V.
Kopich V.M.
Pilyo S.G.
Brovarets V.S.
Department for Chemistry of Bioactive Nitrogen-Containing Heterocyclic Compounds, V.P. Kukhar Institute of Bioorganic Chemistry and Petrochemistry, National Academy of Sciences of Ukraine, 1, Academician Kukhar str., 02094, Kyiv-94, Ukraine

Abstract

The regulatory effect of synthetic plant growth regulators based on synthetic derivatives of N-oxide-2,6-dimethylpyridine (Ivin), 6-methyl-2-mercapto-4-hydroxypyrimidine sodium and potassium salts (Methyur and Kamethur), as well as microfertilizers Rostok Extra and Radix Tim forte plus, used separately or in complex, on the vegetative growth of rapeseed (Brassica napus L.) cv. Sherpa was studied. The highest growth parameters (average length of plant shoots and roots (cm), and average biomass of 10 plants (g)) of rapeseed (Brassica napus L.) cv. Sherpa were obtained when the seeds were treated with synthetic plant growth regulators Methyur and Kamethur, or microfertilizers Rostock extra and Radix Tim forte plus, or a complex of plant growth regulators with microfertilizers: Ivin+Rostok extra, Ivin+Radix Tim forte plus, Methyur+Rostok extra, Methyur+Radix Tim forte plus, Kamethur+Rostok extra, Kamethur+Radix Tim forte plus. The plant growth regulatory activity of the Ivin, Methyur and Kamethur or microfertilizers Rostok Extra and Radix Tim forte plus, which were used separately or in complexes, was similar to the plant hormone auxin IAA. Based on the obtained results, it is suggested to use of synthetic plant growth regulators Ivin, Methyur and Kamethur separately or in a complex with microfertilizers Rostok extra and Radix Tim forte plus to improve the vegetative growth of rapeseed (Brassica napus L.) cv. Sherpa.

Keywords: *Brassica napus L., IAA, Ivin, Methyur, Kamethur, Rostok Extra, Radix Tim forte plus.*

Introduction. *The development of new environmentally friendly plant growth regulators to improve the vegetative growth and increase the yield of an important oil and biofuel crop - rapeseed (Brassica napus L.) against the background of biotic and abiotic stress factors, while reducing the use of environmentally toxic pesticides is an urgent task of modern agriculture [1].*

The new effective and environmentally friendly plant growth regulators based on synthetic low molecular weight heterocyclic compounds, derivatives of N-oxide-2,6-dimethylpyridine (Ivin), 6-methyl-2-mercapto-4-hydroxypyrimidine sodium and potassium salts (Methyur and Kamethur), were developed at the V.P. Kukhar Institute of Bioorganic Chemistry and Petrochemistry, of the NAS of Ukraine (Figure 1) .

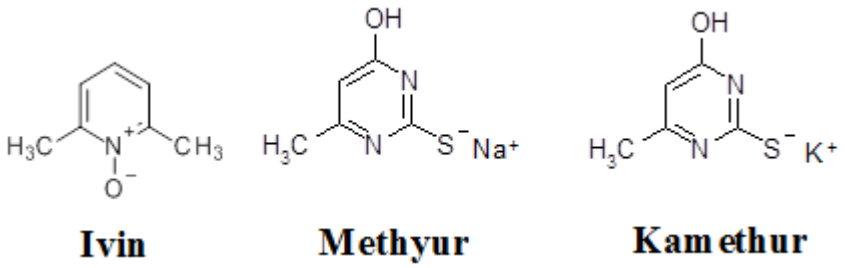


Figure 1. Chemical structure of synthetic plant growth regulators, derivatives of N-oxide-2,6-dimethylpyridine (Ivin), MW=125,17, sodium salt of 6-methyl-2-mercapto-4-hydroxypyrimidine (Methyur), MW=165,17, potassium salt of 6-methyl-2-mercapto-4-hydroxypyrimidine (Kamethur), MW=181,28

Numerous studies carried out in laboratory and field conditions have proven the high regulatory effect of synthetic plant growth regulators Ivin, Methyur and Kamethur, used alone or in combination with microfertilizers Rostok Extra and Radix Tim forte plus, on the growth of grain, leguminous vegetable, and technical crops, increasing their yield and adaptive properties to stress factors of abiotic and biotic nature [2 - 6]. The compositions of the microfertilizers Rostok Extra produced by the LLc "Ukrainian Agrarian Resource" company and Radix Tim forte plus produced by the "Forcrop" Company (Spain) and recommendations for their practical use are given in our previously published work [4]. Thanks to the use of synthetic plant growth regulators Ivin, Methyur and Kamethur and their complex with microfertilizers, it will be possible to reduce the use of environmentally toxic pesticides for plant protection and improve the ecological condition of the entire agricultural system.

This work is aimed at studying the regulatory effect of synthetic plant growth regulators Ivin, Methyur, Kamethur and their complex with microfertilizers Rostok Extra and Radix Tim forte plus on the vegetative growth of rapeseed (Brassica napus L.) cv. Sherpa [7].

Materials and methods. *The regulatory effect of synthetic plant growth regulators Ivin, Methyur, Kamethur and microfertilizers Rostok Extra and Radix Tim forte plus on the growth of rapeseed (Brassica napus L.) cv. Sherpa was studied. For this, the seeds were treated with microfertilizers Rostok Extra at a concentration of 100 ml per 1 liter of distilled water or Radix Tim forte plus at a concentration of 50 ml per 1 liter of distilled water, or each of the plant growth regulators Ivin, Methyur, or Kamethur at a concentration of 10^{-7}M, or a complex of each of the plant growth regulators Ivin, Methyur, Kamethur with microfertilizers Rostok Extra and Radix Tim forte plus used in the above mentioned concentrations. The plant growth regulatory activity of the Ivin, Methyur and Kamethur, as well as microfertilizers Rostok Extra and Radix Tim forte plus, was compared with the activity of the plant hormone auxin IAA (1H-indol-3-yl)acetic acid), MW=175,19, used at a similar concentration of 10^{-7}M. The treated seeds were placed in a thermostat for germination in the dark at a temperature 20-22°C for 48 hours. After this procedure, germinated seeds were placed in a climatic chamber, where seedlings were grown in a light/dark regime of 16/8 hours, at a temperature of 20-22 °C, a light intensity of 3000 lux and an air humidity of 60-80 %. The growth parameters of rapeseed plants (average length of shoots and roots (cm), and average biomass of 10 plants (g)) were measured on the 14th day according to the method [8]. Statistical processing of the data of the experiments performed in three replications was carried out according to the Student's-t variance test with a significance level of P≤0.05; the values are average ± SD.*

Results and Discussion. *The conducted studies showed a positive effect of synthetic plant growth regulators Ivin, Methyur, Kamethur, which were used alone or in combination with fertilizers, on the growth of shoots and roots of rapeseed (Brassica napus L.) cv. Sherpa for 14 days in laboratory conditions. The plant growth regulatory activity of the Ivin, Methyur and Kamethur or microfertilizers Rostok Extra and Radix Tim forte plus, which were used separately or in complexes, was similar to the auxin IAA. Statistical analysis of growth parameters of 14-day-old rapeseed (Brassica napus L.) cv. Sherpa showed that the parameters of shoots and roots of plants treated with synthetic plant growth regulators Ivin, Methyur, Kamethur and microfertilizers Rostok Extra and Radix Tim forte plus, which were used separately or in a complex, exceeded the growth parameters of control plants.*

The average length of shoots (cm) increased both with the separate use of microfertilizer Radix Tim forte plus - by 60.71%, and with the separate use of plant growth regulators: Ivin - by 44%, Methyur - by 51.43 %, Kamethur – by 62%, and also with the use of plant growth regulators in a complex with microfertilizers: Ivin+Radix Tim forte plus – by 24.29%, Methyur+Radix Tim forte plus – by 17.55%,

Methyur+Rostok Extra – by 136.57%, Kamethur+Radix Tim forte plus – by 80%, Kamethur+Rostok Extra – by 111.43%, respectively, compared to the control plants (Figure 2, A). An increase in the average length of shoots (cm) by 40.26% compared to the control plants was also observed under the regulatory effect of auxin IAA (Figure 2, A).

The average length of roots (cm) increased both with the separate use of microfertilizers: Radix Tim forte plus - by 133.68% and Rostok Extra - by 85.26%, and with the separate use of plant growth regulators: Ivin - by 76.84%, Methyur - by 147.37 %, Kamethur – by 145.34%, and also with the use of plant growth regulators in a complex with microfertilizers: Ivin+Radix Tim forte plus – by 86.60%, Ivin+Rostok Extra – by 149.76%, Methyur+Radix Tim forte plus – by 161.05%, Methyur+Rostok Extra – by 203.64%, Kamethur+Radix Tim forte plus – by 173.68%, Kamethur+Rostok Extra – by 256.84%, respectively, compared to similar parameters of control plants (Figure 2, B). An increase in the average length of roots (cm) by 78.2% compared to the control plants was also observed under the regulatory effect of auxin IAA (Figure 2, B).

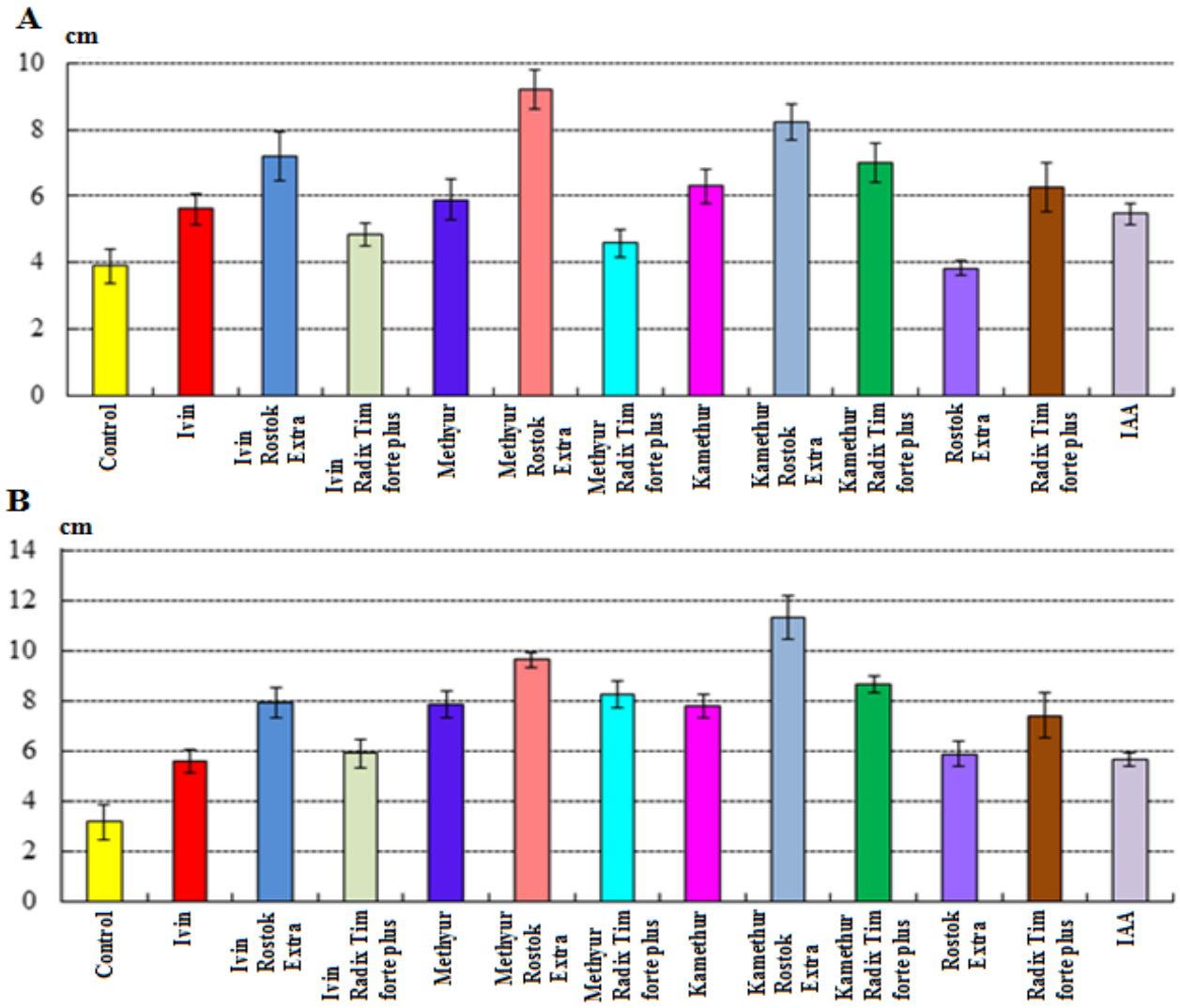


Figure 2. The regulatory effect of auxin IAA, synthetic plant growth regulators Ivin, Methyur, Kamethur and microfertilizers Rostok Extra and Radix Tim forte plus, which were used separately or in a complex, on the average length of shoots (cm) (A) and average length of roots (cm) (B) of 14-day-old rapeseed (Brassica napus L.) cv. Sherpa, compared to the control plants

The average biomass of 10 plants (g) increased both with the separate use of microfertilizers: Radix Tim forte plus - by 38.25% and Rostok Extra - by 42.41%, and with the separate use of plant growth regulators: Ivin - by 39.88%, Methyur - by 56.84 %, Kamethur – by 49.46 %, and also with the use of plant growth regulators in a complex with microfertilizers: Ivin+Radix Tim forte plus – by 59.03%, Ivin+Rostok Extra – by 48.47%, Methyur+Radix Tim forte plus – by 64.97%, Methyur+Rostok Extra – by 69.62%,

Kamethur+Radix Tim forte plus – by 72.51%, Kamethur+Rostok Extra – by 93.37%, respectively, compared to similar parameters of control plants. An increase in the average biomass of 10 plants (g) by 29.35% compared to the control plants was also observed under the regulatory effect of auxin IAA.

Summarizing the obtained data, it should be noted that the regulatory effect of the synthetic plant growth regulators Ivin, Methyur, Kamethur and microfertilizers Rostok Extra and Radix Tim forte plus, which were used separately or in complexes, was similar to the plant hormone auxin IAA, which controls the elongation, division and differentiation of plant cells, growth of plant tissues and organs [9, 10]. This can be explained by the fact that the high regulatory effect of synthetic plant growth regulators and microfertilizers is due to their composition. A plant growth regulator Ivin contains the macronutrient nitrogen; Kamethur contains the macronutrients nitrogen, potassium and sulfur, which are necessary for plant growth and metabolism [4, 5]. Plant growth regulator Methyur contains the macronutrients nitrogen, sulfur and the chemical element sodium, which promote plant growth and adaptation to salt and osmotic stress [4, 5]. Microfertilizers Rostock extra and Radix Tim forte plus contain macronutrients and micronutrients such as nitrogen, phosphorus, potassium, magnesium, sulfur, manganese, boron, zinc, iron, copper, free amino acids, humic substances, which improve plant growth and metabolism [4, 5].

Conclusion. *The results obtained indicate the prospects for the practical use of synthetic plant growth regulators Ivin, Methyur, Kamethur and microfertilizers Rostok Extra and Radix Tim forte plus when used separately or in a complex to improve the growth of shoots and roots of rapeseed (Brassica napus L.) cv. Sherpa in the vegetative phase.*

References

1. Tsygankova V., Andrusevich Ya., Kopich V., Shtompel O., Veligina Y., Pilyo S., Kachaeva M., Kornienko A., Brovarets V. Use of Oxazole and Oxazolopyrimidine to Improve Oilseed Rape Growth. Scholars Bulletin. 2018. 4(3): 301 – 312. DOI: 10.21276/sb.2018.4.3.8.

2. Tsygankova V.A., Voloshchuk I.V., Andrusevich Ya.V., Kopich V.M., Oliynyk O.O., Stefanovska T.R., Pidlisnyuk V., Pilyo S.G., Klyuchko S.V., Brovarets V.S. Use of synthetic plant growth regulators in agriculture and biotechnology. Polish Journal of Science. 2023. 1(68): 12 – 17. DOI: 10.5281/zenodo.10131991.

3. Tsygankova V.A., Voloshchuk I.V., Pilyo S.H., Klyuchko S.V., Brovarets V.S. Enhancing Sorghum Productivity with Methyur, Kamethur, and Ivin Plant Growth Regulators. Biology and Life Sciences Forum. 2023. 27(1): 36. https://doi.org/10.3390/IECAG2023-15222

4. Tsygankova V.A., Andreev A.M., Andrusevich Ya.V., Pilyo S.G., Klyuchko S.V., Brovarets V.S. Use Of Synthetic Plant Growth Regulators In Combination With Fertilizers to Improve Wheat Growth. Int J Med Biotechnol Genetics. 2023. S1: 02: 002: 9-14. URL: http://scidoc.org/IJMBGS1V2.php.

5. Tsygankova V.A., Andreev A.M., Andrusevich Ya.V., Pilyo S.G., Brovarets V.S. Effect of plant growth regulators and fertilizers on the vegetative growth of sunflower (Helianthus annuus L.). The scientific heritage. 2023. 116(116): 3–9. DOI: 10.5281/zenodo.8129039. URL: https://doi.org/10.5281/zenodo.8129039

6. Tsygankova V.A., Andreev A.M., Andrusevich Ya.V., Kopich V.M., Klyuchko S.V., Pilyo S.G., Brovarets V.S. Use of Ivin, Methyur, Kamethur and microfertilizers to improve the growth of oilseed flax (Linum usitatissimum L.). Annali d'Italia. 2023. 48: 3–10. DOI: 10.5281/zenodo.10034697.

7. Tsygankova V.A., Andreev A.M., Andrusevich Ya.V., Kopich V.M., Pilyo S.G., Klyuchko S.V., Brovarets V.S. Synergistic effect of synthetic plant growth regulators and microfertilizers on the growth of canola (Brassica napus L.). Danish Scientific Journal (DSJ). 2023. 77(1): 8–12. DOI: 10.5281/zenodo.10053315.

8. Voytsehovska O.V., Kapustyan A.V., Kosik O.I. Plant Physiology: Praktykum, Parshikova T.V. (Ed.), Lutsk: Teren, 2010. 420 p.

9. Zhao Yu. Auxin biosynthesis and its role in plant development. Annu Rev Plant Biol. 2010. 61: 49-64. doi: 10.1146/annurev-arplant-042809-112308.

10. Sosnowski J., Truba M., Vasileva V. The impact of auxin and cytokinin on the growth and development of selected crops. Agriculture. 2023. 13(3): 724. https://doi.org/10.3390/agriculture13030724.

Historical sciences

TURKISH VECTOR OF ACTIVITY OF THE UNION FOR THE LIBERATION OF UKRAINE IN THE WORKS OF IVAN PATER

Hasanov Gara ogly

Abstract

The article examines the scientific legacy of the famous Ukrainian historian, professor Ivan Pater, on the history of Ukrainian-Turkish relations during the First World War and, first of all, the activities of representatives of the Liberation Union of Ukraine (LUU) in Istanbul. It was noted that the history of Turkish-Ukrainian relations became even more relevant in connection with the Russian armed attack on Ukraine and Turkey's special position in this war. As a result of the analysis of the source base of the work, it was established that, in contrast to actual historical research, the historiography of Ukrainian-Turkish relations during the First World War period is insufficiently developed. This determined the purpose of our research, which consists in clarifying the peculiarities of the reception of the scientist I. Pater regarding the activities of the ULU mission in Istanbul during the war. In addition to general scientific principles, the article uses methods of content analysis, historiographical, and comparative. It was found out that the historian thoroughly researched the diplomatic efforts of the delegates of the Ukrainian Armed Forces and the Main Ukrainian Council to establish relations with the public, governmental and military-political circles of the Ottoman Empire and emphasized their importance as the first Ukrainian-Turkish contacts in the 20th century. The historian subjected to professional analysis information and propaganda and publishing work in the capital of Turkey and established its effectiveness in clarifying the Ukrainian question in the world and forming the national consciousness of Ukrainians. The participation of the ULU, primarily Maryan Melenevskyi, in the joint preparation with representatives of the Central Powers of the military-political "Constantinople Action" of 1914 has also been fairly consistently investigated. The appropriate professional level of the researcher was noted. which is based on an extensive source base, including documents of Ukrainian and foreign archival funds. The scientist generally successfully combines the analysis of events and phenomena with his own generalizations, clarifies many facts from the history of ULU activity in Istanbul, not taken into account by many other researchers. At the same time, some omissions of I. Pater in the study of the Turkish arena of ULU activity were revealed. Among them is the lack of an explanation of the reasons for checking the activities of the ULU, in particular one of its leaders, M. Zaliznyak, by a special commission. The omission of plots of ULU activity in the Ottoman Empire in 1915 in the camp of prisoners of war in Izmid, facts of contacts and agreements with representatives of Muslim, Persian Georgian organizations, etc. was also observed. It is proposed to continue the historiographic research of Ukrainian-Turkish relations during the First World War both in the conceptual and in the prosopographic dimension, for which a sufficiently representative source base has been accumulated by both Ukrainian and foreign researchers.

Keywords: *historiography, First World War, Ukrainian-Turkish relations, Union for the Liberation of Ukraine, "Constantinople Action", Ivan Pater, Maryan Melenevskyi.*

Introduction.

Ukrainian-Turkish relations, interrupted with the loss of Cossack statehood, were restored only in the 20th century, a priori they are relevant due to the neighborhood of the two countries, their geopolitical position between Europe and Asia and the special role of Turkey in the ongoing Russian-Ukrainian war. Accordingly, scientists are increasingly interested in understanding historical lessons, successes and failures of Ukrainian politicians and diplomats in the Turkish direction of foreign policy during the First World War. At the same time, in the publications of M. Nesuk [7; 8], Volodymyr and Bohdan Serhiichuk [17; 18; 19; 20] thoroughly investigated the problems of Ukrainian-Turkish relations during the years of the first world armed conflict. On the other hand, professor Ivan Pater, head of the department of modern history of the I. Krypyakevich Institute of Ukrainian Studies of the National Academy of Sciences of Ukraine, investigated the topic through the prism of the activities of the Union for the Liberation of Ukraine (SUV), including the actions of its mission in Constantinople (Istanbul) [9;

10; 11; 12; 13; 14; 15].

Although I. Pater made a significant contribution to the study of Ukrainian political formations during the Great War and their activities in Turkey, his scientific output was only briefly mentioned in the context of the historiography of the Ukrainian issue and Ukrainian political formations during the war, as for example in the dissertation of B. Kryvoshina [4, with. 12]. V. Popenko noted among the studies of Ukrainian-Turkish relations through the activities of the SVU branch in Constantinople only the work of B. Serhiychuk [16, p. 289].

The goal of the work.

Since I. Pater's study did not specifically study the activities of Ukrainian political organizations in Turkey (SVU, GUR, etc.), this is the goal set in our work.

Main part.

Some Ukrainian politicians took into account the coincidence of Ukrainian and Turkish interests in the fight against the greatest common enemy - the Russian Empire, even before the beginning of the First World War of 1914–1918. Thus, Dmytro Dontsov in his speech in July 1913 at the II All-Ukrainian Student Congress, recalled the oppressed position of the Ottoman Empire after the defeats in the Balkan Wars and the potential clash between Russia and Germany over its inheritance [3]. The regime of parliamentary monarchy under a one-party totalitarian military dictatorship was established in the Ottoman Empire, as you know, himself in 1913, after the Young Turk revolution. Ukrainian political centers hostile to the Russian Empire and loyal to the Central Powers or the Quadruple Union (Germany, Austria-Hungary, Turkey, Bulgaria) with the beginning of the Great War, as contemporaries called it, were formed in Lviv.

On August 1, 1914, the (HUR) was restored, led by Kost Levytskyi, and the formation of the Legion of Ukrainian Sich Riflemen (USS) began. On August 4, emigrants from the Dnipro region, mostly social democrats, founded the Union for the Liberation of Ukraine. The union was first headed by D. Dontsov, then from September 21 by Mykola Zaliznyak, and from December 1914 by Andrii Zhuk. Soon after, influential figures of the Ukrainian Social-Democratic Workers' Party, M. Melenevskyi and O. Skoropys-Yoltukhovskyi, joined the organization, and they headed the ULU delegation in Constantinople [2, c. 55].

Since the Ottoman Empire entered the First World War on the side of Russia's enemies, the Central Powers, it is natural that supporters of Ukraine's independence viewed it as a potential ally. According to I. Pater: "So the political orientation towards the Central Powers testified to the desire of the ULU to use any opportunity to achieve its national goals. Actually, this directed the views of Ukrainian politicians towards Turkey" [15, c. 19].

At the same time, Ukrainian politicians focused on support from Germany and Austria-Hungary. The members of the Presidium of the Soviet Union in conversations with the Austrian consul E. Urbas on August 2-15, 1914 in Lviv called on Austria-Hungary to change its policy towards Ukraine. However, I. Pater, relying on the documents of the Canadian archive [6, f. 12], found out that the Austrian General Staff planned to use the structures of the Union primarily as a means of sabotage on the front or in the rear of the enemy [10, c. 510].

The Union in Vienna on August 25, 1914, published a series of appeals, outlining its political platform in the new conditions,. The historian noted: "In the appeal "To the public opinion of Europe", where Melenevsky is the main author, Russia's provocative role in the world crisis, its pan-Slavistic invasion plans, is exposed, it is emphasized that "Russia has crushed Poland, weakened Turkey, is trying to capture the Dardanelles and Istanbul"" [9, p. 232]. There was a call to the Turks, together with the Ukrainians, to oppose Russia as a sign of restoring the ancient Turkish-Ukrainian ties of the Cossack era and to fight for the independence of Ukraine, as a guarantee of Turkey's security in a separate appeal to the Turkish people. I. Pater emphasized in his monograph that these appeals became the first acts of Ukrainian foreign policy since the Mazepyn emigration, the first appearance on the international arena of the political organization of the Transnistrians on behalf of the Ukrainian people and a prologue to further informational and diplomatic actions of the SSU [14, p. 75–76].

The recall of the ULUs became the first official document in the relations between Ukraine and Turkey and found a response in Constantinople, accordingly as the scientist emphasized. The Union intended, with this appeal, to persuade the Turkish government to enter the war on the side of the Central Powers in order to protect Turkey from the conquering plans of Russia and create the prerequisites for the independence of Ukraine [13, p. 637].

The historian noted that, in addition to informational work, SVU launched organizational and diplomatic activities. One of the members of the Presidium of the SVU, Maryan Melenevskyi (one of his pseudonyms is Basok), was sent to Constantinople with the task of "acquiring a political opinion for the

Ukrainian cause, for the cause of the liberation of the peoples of Russia in favor of the war with Russia" [13, p. 638].

As noted by I. Pater, before leaving for Constantinople, M. Melenevsky, together with another member of the Presidium of the SVU, O. Skoropys-Yoltukhovsky, was received by the representative of the Ministry of Foreign Affairs (MFA) of Austria-Hungary, Oleksandr von Goyos, who assured that his state supported the idea of liberating Ukraine from Russian captivity. At the same time, the historian expressed a logical assumption about the circumstances, which, as a rule, are not taken into account by other researchers: "Obviously, what O. Hoyos said to the representatives of the ULU was agreed with the German government. The transmission of his words to the Turkish government factors gave officiality to the arrival of Ukrainian politicians and raised them to the level of a government visit, which to some extent went far beyond the relations of the union with the governments of Austria-Hungary and Germany" [15, p. 20].

I. Pater noted that in November 1914, following M. Melenevskyi, Austrian parliament member Longyn Tsegelskyi and Stepan Baran, a member of the Presidium of the GUR, also arrived in the capital of the Ottoman Empire. This caused favorable reviews of the Turkish press, where, in particular, an interview of M. Melenevskyi, favorable to Turkey, was published, in which he also talked about the fate of the Ukrainian people in Russia. The politician also held a series of meetings-conferences with members of the Young Turks Committee and government representatives, established contacts with military circles.

Instead, L. Tsegelskyi and S. Baran published a number of articles on the history of Ukraine in the Turkish press, emphasis that Ukraine, once an independent state, languished under Russian oppression for a long time and now, in a critical period for the world, is ready to fight for its independence and freedom together with Austria, Germany and Turkey against the common enemy – Russia. In addition, in Istanbul, the union published L. Tsegelskyi's brochure "Russia as an oppressor of nations", as well as tens of thousands of leaflets addressing Turkish soldiers, and in December – to Russian soldiers to Ukrainian soldiers of the Russian army [11, p. 258].

The historian investigated that the collection of articles "Ukraine, Russia, Turkey", which was published in Istanbul in 1915, played an important role in the understanding of the Ukrainian issue by the Turkish educated public. The book, published in Turkish, included articles: "Ukraine and Turkey" by L. Tsegelskyi , "Brief overview of Ukrainian history" by M. Hrushevskyi, "Cultural work of Ukrainians" by M. Melenevskyi, "Russian Ukraine in numbers" by A. Zhuk. The appendices of the collection contain appeals "To the Turkish people", "To the public opinion of Europe", the political platform of the ULU, as well as a map of Europe and Ukraine. In Constantinople in 1915, the printing house of the Georgian monastery published the second edition of L. Tsegelskyi's book "Rus - Ukraine, and Muscovy - Russia", which made a significant contribution to the elevation of the national consciousness of Ukrainians. Most of the publication's circulation, which was between 15,000 and 40,000 copies, was shipped to Ukraine by Turkish intelligence. Some of the books ended up in prisoner of war camps and played an important role in the self-identification of prisoners of the Russian army and navy as Ukrainians [11, p. 258].

In general, the historian in his study of the informational and diplomatic activities of the ULU assessed the propaganda work in Turkey as effective and rightly emphasized: "The presence and activities of representatives of the Union in Constantinople caused a kind of Ukrainian explosion in the Turkish press" [15, p. 21].

I. Pater, having researched the informational and publishing work of the ULU on the propaganda of Ukrainian affairs, however, bypassed the vicissitudes of the national educational activities of the Union in the camp of prisoners and internees in Izmid. Meanwhile, as I. Sribnyak, a researcher of this issue, established, the representatives of the ULU managed to ease the conditions of Ukrainian prisoners in the camp and carried out some educational work. However, as the historian stated, the Union achieved only partial success in awakening the national consciousness of the descendants of the Cossacks. The scientist established: "...all efforts of the representatives of the ULU to collect captured Ukrainians in a separate camp and to organize planned work of a national and patriotic content among them turned out to be unsuccessful due to the inertness of the Ottoman government factors [21, p. 246–247].

I. Pater found out that in the first days after his arrival in Constantinople, M. Melenevsky, with the help of the influential social democrat O. Parvus (I. Gelfand), established contacts with the German diplomats M. Zimmer and H. Nebel and the influential general Liman Pasha (L. Sanders). The latter had access to both the Sultan and the real power of the Young Turks (Enver Pasha, Cemal Pasha and Talaat Pasha). As a result of mutual interest, the Minister of Internal Affairs of the Ottoman Empire Talaat Bey and the Minister of War Enver Pasha received M. Melenevsky without delay, as well as the member of

the Austrian Parliament Longin Tsegelsky, member of the Presidium of the GUR Stepan Baran and assured the Ukrainians of the support of their liberation plans.

On November 24, 1914, the Stambul newspaper "Zion Turk" published the Declaration of Mehmed Talaat-bey, who supported the independence aspirations of Ukrainians. As I. Pater emphasized: "Talaat-bey's statement became the first official document in modern international relations in which the right of the Ukrainian people to create their own independent state was recognized" [13, p. 639]. Indeed, the Declaration had far-reaching consequences and international resonance. Information about it was spread by Turkish magazines and many European publications, and in Russia it was commented on as treason by Ukrainians.

In the publications of I. Pater, in addition to the diplomatic activities of the SSU, the union's participation in the military-political projects of the Central Powers is traced, in particular in the "Constantinople action". The content content of this military operation consisted in the landing of Turkish-Ukrainian troops to organize anti-Russian uprisings in the Kuban and Odesa. The leaders of the Union hoped that the Turkish army would capture the Russian coast of the Black Sea with its Ukrainian population even before the open attack of the German-Turkish squadron on October 28–30, 1914, on Russian ships and ports. Therefore, the Ukrainian Legion, organized with the support of the Austro-Hungarian and German government circles, was to land together with the Turkish troops on the Black Sea coast and cause an insurgent movement. At the same time, the members of the ULU tried to explain to the people that the planned Constantinople action does not come from the Turks and is in the interests of building the Ukrainian state. The success of the action was to justify the political orientation of the Union towards the Central Powers and dispel the doubts of Ukrainians about the fact that they are allegedly being used as cannon fodder in the war [15, p. 24].

Historians I. Pater, O. Kuraev, and others, referring to the report of consul E. Urbas to the head of the intelligence department of the Austrian General Staff O. Granylovich, stated that Austria-Hungary and Germany were developing a plan to land a 50,000-strong landing force in the Odesa area and, as an "auxiliary action", a plan for an uprising in the Russian Ukraine at the end of August 1914. Later, in mid-September, M. Zaliznyak promised that his agents would establish contacts with sailors of the Black Sea Fleet and dockers, so that simultaneously with the actions of the Allies to prepare an uprising in the Russian rear, during the negotiations between the SSU representatives and German diplomats [5, p. 81–82, 87].

As I. Pater observed, on October 4, 1914, the Ministry of Foreign Affairs of Austria-Hungary approved the insurgent plan of the Union, which it informed its ambassador in Istanbul, J. Pallavichin. At the same time, the government of Austria-Hungary officially appealed to the ruler of the Ottoman Empire with a proposal to start practical preparations for the supply of Ukrainian volunteers and their landing. But the technical unpreparedness of the Turkish and German parties for this was revealed. An attempt by the military ministry of Austria-Hungary to obtain weapons and ammunition in Holland also failed [15, p. 25]. I. Pater noted that in November 1914, the Union appealed to the Austro-Hungarian government to allow a unit of 500 Ukrainians – 400 Sich riflemen and 100 Ukrainian prisoners of war from Freistadt camp, based on archival documents and the work of R. Rozdolskyi.

The delegate of the SVU in Constantinople, M. Melenevsky, took part in the discussion of the Constantinople action with the representatives of the Turkish Minister of War Enver Pasha" and German diplomats. According to the approved plan of the Constantinople action, Liman Pasha's 50,000-strong Turkish corps was supposed to land in the North Caucasus and provoke an uprising of the Circassians (Kabardians) and Kuban Cossacks in order to establish the Ukrainian state. All these measures of the ULU were supported by the Main Ukrainian Council, which prepared the points of agreement between Ukrainian politicians and the German, Austro-Hungarian and Turkish governments, on the basis of which it was possible to send snipers to Constantinople. The Ukrainian Expeditionary Force was to be headed by Colonel Stanislav Sheptytskyi of the Austrian General Staff, the brother of Andrey Sheptytskyi, Metropolitan of the Ukrainian Greek Catholic Church, according to the agreement of the GUR, the Combat Command of the Ukrainian Armed Forces and the ULU, [13, p. 642–643].

However, as noted by I. Pater, the preparation of the Ukrainian expeditionary corps took place with great difficulties and ended unsuccessfully. Referring to the data of W. Biel [1, p. 521], the historian reported that by December 1, 1914, 20 volunteers from prisoners of war volunteered to participate in the expedition [15, p. 26]. Moreover, when in mid-November 1914 the Sich riflemen were ready to leave for Constantinople, it became known that the Turkish fleet was unable to break the Russian resistance and capture the Black Sea, and the ground forces captured only a small territory in the Caucasus, which made the uprising in the Kuban impossible. Therefore, on November 16, 1914, Minister of War Enver

Pasha told Y. Pallavicina that if 500 Ukrainians under the command of Austrian officers were still inclined to a military operation, then Turkish ships would transport them across the Black Sea, and there the soldiers should act at their own discretion. Under such conditions, the Austrian government decided not to send the Ukrainian corps to Constantinople. Therefore, the Constantinople action failed due to the events on the fronts, which disrupted the military cooperation with Turkey expected by the Ukrainian political leadership [15, p. 27].

However, in the opinion of I. Pater, informational and diplomatic actions of representatives of SVU and GUR in Turkey testified that the Ukrainian case has become an important factor in international politics. In particular, in 1914–1915, a real understanding of the Ukrainian question and its significance for the Ottoman Empire was awakened in Turkey. On May 2, 1917, the Union for the Liberation of Ukraine officially refused to hold a diplomatic campaign at the international level in connection with the declaration of Ukrainian statehood by the Central Rada. The initiated connections between Ukrainian politicians and Turkish government officials contributed to the normalization of diplomatic relations between the two countries in 1918 and thereafter. In particular, in February 1918, Turkey recognized the independence of the Ukrainian People's Republic without delay. The governments of the Ukrainian People's Republic, and later the Ukrainian State of Hetman P. Skoropadskyi, took over the representative functions of the ISU and the organization dissolved itself, leaving a deep mark in the history of national liberation struggles [12, p. 373–374].

Conclusions.

In general, as it follows from the research of I. Pater, the diplomatic, information-propaganda, and military-political activities of the SSU contributed to the actualization of the Ukrainian issue on the international arena, including in the Ottoman Empire, and the recognition of the natural rights of Ukrainians to self-determination.

The peculiarity of I. Pater's research into the Turkish vector of ULU activity is that his work is based on the analysis of materials from a wide range of sources, in particular unpublished documents of the Central State Archive of the highest authorities and management in of the country, of the Canadian archive "Library and Archives Canada (LAC). R-2297-O-3-E", of the Central State Historical Archive of Ukraine in Lviv. The collection of documents "Ereignisse in der Ukraine 1914–1922 deren Bedeutung und historische Hintergrüende / von T. Hornikiewiecz. Philadelphia, 1966. Band I". publication of periodicals of the time: "Bulletin of the Union of Liberation of Ukraine", "Bulletin of Politics, Literature and Life", "Free Speech", "Dila", "Our Voice", as well as the Turkish press.

In the thematic plane, the researcher did not limit himself to studies of the diplomatic and information-propaganda activities of the representatives of the Union in Turkey, but also covered military-political projects, such as the "Constantinople Action" of 1914.

Another feature of the creative handwriting of I. Pater is a careful approach to the chronology and circumstances of events, to the definition of the positions and functions of political actors from the ULU, the Turkish political community and other participants in the events in different periods, which allowed him to specify many details of the activities and contacts of representatives of the Union, primarily in Constantinople.

At the same time, I. Pater, giving a high assessment of the activities of the ULU in Turkey, leaves out of consideration some negative phenomena in the environment of the Union, such as the fraudulent behavior of one of the heads of the organization, M. Zaliznyak, who was forced to undergo an inspection and return most of the funds allocated by the Austro-Hungarian government to Ukrainian affairs and preparation of the "Constantinople action" in the Northern Black Sea region. Accordingly, the historian, unlike some researchers, for example R. Rozdolskyi, does not indicate the unworthy behavior of M. Zalizniak and some other ULU agents among the reasons for the loss of trust in the Union on the part of Austria-Hungary. Moreover, the scientist ignored the activities of the ULU representatives in Turkey in 2015, in particular, their contacts with Georgian revolutionaries, propaganda activities among prisoners of war in the Izmid camp, etc.

Therefore, I. Pater, specializing in the history of the Union of the Liberation of Ukraine, investigated the wide and multifaceted activities of representatives of this organization on the international arena, including in Turkey, thereby making a significant contribution to the increase of knowledge on the subject. The rich scientific heritage of the historian from the body of research on Ukrainian-Turkish relations during the First World War requires further historiographical elaboration and understanding.

References

1. Bihl W. Österreich-Ungarn und der Bund zur Befreiung der Ukraine. Österreich und Europa.

Festgabe fur Hugo Hantsch zum 70. Geburstag. Graz; Wien; Köln, 1965. [in German].

2. Golovchenko V.I., Soldatenko V.F. The Ukrainian issue during the First World War: Monograph. Kyiv: Parliamentary Publishing House, 2009. 448 p. [in Ukrainian].

3. Dontsov D. The current political situation of the nation and our tasks. (1913). Lviv https://chtyvo.org.ua/authors/Dontsov/Suchasne_politychne_polozhenie_natsii_i_nashi_zavdannia/ [in Ukrainian].

4. Kryvoshina B.M. Ukraine in the First World War: national historiography: autoref. dis. ... cand. hist. sciences: 07.00.06. Lviv, 2004. 20 p. [in Ukrainian].

5. Kuraev O.O. The Ukrainian factor in the politics of Germany and Austria-Hungary during the First World War: dis. ... doct. of hist. sciences: 07.00.02. Kyiv, 2006. 499 p. [in Ukrainian].

6. Library and Archives Canada (LAC). R–2297–0–3–E. Vol 15. File 22.

7. Nesuk M. Drama of choice. Ukraine's relations with the Central Powers in 1917–1918. Kyiv: Politichna dumka, 1999. 274 p. [in Ukrainian].

8. Nesuk M.D. Ukrainian-Turkish relations in 1914–1918. The Great War of 1914–1918 and Ukraine. Historical essays: in 2 books / ed. O. Reent. Kyiv: Klio, 2014. Vol. 1. P. 110–121. [in Ukrainian].

9. Pater I.H. "He was not a sales person" (touches on the political portrait of Maryan Melenevskyi). New age. 2022 (10). P. 224–245. [in Ukrainian].

10. Pater I. "Ukrainian question" in the Entente and Austro-German dimensions. (August 1914–February 1917). Bulletin of Lviv University. The series is historical. 2019–2021. Special issue. P. 494–519. [in Ukrainian].

11. Pater I.H. Diplomatic and information activities of the Union for the Liberation of Ukraine (1914–1918). Problems of the history of Ukraine in the 19th and early 20th centuries. 2005. Vol. 9. P. 254–263. [in Ukrainian].

12. Pater I.H. Union for the Liberation of Ukraine: foundation, political platform, informational and diplomatic activity. The Great War of 1914–1918 and Ukraine. Historical essays: in 2 books / ed. O. Reent. Kyiv: Clio, 2014. Vo1. P. 363–376. [in Ukrainian].

13. Pater I. Union of Liberation of Ukraine and Turkey. Confraternitas: jubilee. coll. in honor of Yaroslav Isaevich. Lviv: NAS of Ukraine, Institute of Ukrainian Studies named after I. Krypyakevych, 2006–2007. P. 636–644. [in Ukrainian].

14. Pater I. Union for the Liberation of Ukraine: problems of statehood and sobrality. Lviv: NAS of Ukraine, Institute of Ukrainian Studies named after I. Krypyakevych, 2000. 346 p. [in Ukrainian].

15. Pater Ivan. Turkish orientation of Ukrainian politicians during the First World War. New age. 2021. Is. 9. P. 17–29. [in Ukrainian].

16. Popenko Yaroslav. Ukrainian-Turkish interstate relations during 1914–1920s: a historiographical review. Ukrainian studies almanac. 2014. pp. 285–291. [in Ukrainian].

17. Serhiychuk B. Revival of Ukrainian-Turkish relations at the beginning of the 20th century. Foreign affairs. 2013. No. 8. P. 60–63. [in Ukrainian].

18. Serhiychuk B., Serhiychuk V. On the border of two worlds: Ukrainian-Turkish relations in the middle of the 16th – at the beginning of the 21st century. Kyiv: PP Serhiychuk M. I., 2012. 320 p. [in Ukrainian].

19. Serhiychuk B.V. Ukrainian-Turkish relations in the first quarter of the 20th century: dis. ... cand. of hist. sciences: 07.00.02. Kyiv, 2011. 230 p. [in Ukrainian].

20. Serhiychuk V. Turkish vector of Ukrainian freelancers. Historical journal. 2006. No. 6. P. 93–104. [in Ukrainian].

21. Sribnyak I.V. The national awareness activities of the ULU in the Izmid prisoner of war and internment camp (Ottoman Empire) at the beginning of the First World War: an unknown document from the funds of the Ukrainian Central Military Academy. Archives of Ukraine. 2019. 2 (319). P. 242–251. [in Ukrainian].

ABOUT GLOBAL INITIATIVES FOR A GREEN FUTURE

Aliyeva Shabnam Ali
Phd student,
Nakhchivan Teachers Institute, Azerbaijan
ORCHID ID: 0000-0002-9716-7629
Huseynova Gulnar Rustam
Phd student,
Nakhchivan Teachers Institute, Azerbaijan
ORCHID ID: 0000-0002-7603-7462

Abstract

The phrase "for the sake of a Green World" refers to the actions taken to protect the environment and solve environmental problems. This may include different initiatives, programs and policies to protect nature and the environment. Such activities may include various measures for the use of environmentally friendly technologies, recycling, energy efficiency, promotion of renewable energy sources and nature protection. These initiatives aim to create a greener and more sustainable world for the health of our planet and future generations. Also, environmental research and innovative projects are encouraged in Azerbaijan. Universities and research institutes conduct research and develop innovative solutions to solve environmental problems.

Keywords: *green world, environment, Azerbaijan, green future*

Looking at our 30-year history of independence, it is possible to say with certainty that our country contributes to the fight against the consequences of climate change. Hosting the COP-29 conference can be considered the most important event of 2024 for Azerbaijan and a logical continuation of the country's strategy of transition to a green economy. In accordance with this mission, 2024 was declared the "Year of Solidarity for the Green World" in Azerbaijan by the Decree of the President of the Republic of Azerbaijan Ilham Aliyev. "Azerbaijan will show itself in this field as an oil and gas country, and everyone in the world will once again see that our agenda is related to green energy. The creation of green energy types is a priority of our energy policy. This is a reality, and the whole world will see it again," President Ilham Aliyev stressed at the meeting on the holding of COP-29 in our country on December 15 last year. Entrusting the hosting of COP-29 to our country is an indication of high confidence in Azerbaijan in the fight against the global problem. Yes, our country's steps in this direction are manifested not in words, but in deeds. Azerbaijan has done important work in order to reduce its carbon footprint. Our country has turned a whole part of the Black City, which was polluted as a result of Baku's oil production, into a White City where about 200,000 people currently live. In parallel with this, Azerbaijan has taken on ambitious obligations. Important steps taken in the direction of reducing the carbon footprint, giving a significant place to the application of environmentally friendly technologies, ambitious goals such as the use of clean energy sources, successful achievements in the production of renewable energy are some of the effective steps taken by Azerbaijan in the direction of the transition to green energy and the fight against climate change. Azerbaijan is a country that takes quite substantial initiatives and practical steps in the direction of climate change. The declaration of Karabakh and East Zangezur, as well as NAR (Nakhchivan Autonomous Republic) as a green energy zone, also shows our sincere intention to fight this global problem. Today, preservation of ecological balance, rational use of natural resources, protection of water, soil and atmospheric air from pollution has become a universal problem. In order to ensure our health, first of all, it is necessary to make nature healthy and protect the environment.

In the 20th and 21st centuries, the rapid development of all areas of the economy, the overexploitation of natural resources that will not be able to be restored in the future, have made the negative impact on the environment inevitable. "The global ecological crisis, environmental problems have become one of the most important requirements for the development of humanity today. In recent years, in our country, which has achieved enough achievements in the fields of social and economic development, carrying out large-scale work in the direction of solving environmental problems, improving the ecological situation is one of the important components of the sustainable development strategy of the state policy.

In our globalized world, the protection of nature worries all the peoples of the world. In most

European countries, there is a harsh attitude towards those who spoil nature, and attention is being paid to the expansion of green belts every year. Minimization of environmental pollution, efficient use of natural resources, and utilization of alternative energy sources are the main directions of the environmental policy of our country to ensure ecological safety. Let's not forget that no country, regardless of the level of development, is immune to the effects of climate change. We can clearly see this from the extreme natural disasters that occur in nature. Joint efforts aimed at preventing the problem caused by global climate changes, which is one of the most difficult problems faced by humanity, have always been supported by our country, and our citizens have demonstrated their activity in this field.

"Every person should plant, cultivate and grow a tree. If someone cuts a healthy tree, he not only betrays his people, nation, country, he betrays his family and himself. Treating the rich resources that nature has given our country with special care, protecting such unique treasures for the sake of the future of humanity is one of our main tasks." These words spoken by Heydar Aliyev, the great leader of our people, retain their relevance today. It is the result of our state's environmental policy, valuing and treating nature with care that people live in harmony with nature, protect our nature, rich flora and fauna, and do their best to make our country a land of greenery.

Today, the environmental policy defined by our great leader is successfully continued by the President of the Republic of Azerbaijan, Ilham Aliyev. The work done in the field of nature protection under the leadership of the head of the country, the state care given to this field requires each of us to treat nature, the land, and the Motherland with care and love.

The Heydar Aliyev Foundation, headed by First Vice-President Mehriban Aliyeva, also pays special attention to the establishment of new green areas and the protection of existing green areas in our country. In this matter, Leyla Aliyeva, the vice-president of the Heydar Aliyev Foundation, the founder and head of "IDEA Public Union", has an important role in the projects implemented with the initiative and support. Ecological projects implemented at different times cover all regions of Azerbaijan and make great contributions to improving the ecological situation of our country in general.

Today, tree-planting campaigns are held all over Azerbaijan with the participation of citizens, a "Red Book" has been created for the protection of the gene pool of flora and fauna, specialists in the study of rare and endangered species conduct regular monitoring. the trees they planted give nature color, beauty, and at the same time clean air. Just as it is the right of every citizen to benefit from the environment and nature, it is the duty of each of us to protect and take care of it. The rich nature of our homeland is the wealth of our people. Therefore, it is the filial duty of every citizen of Azerbaijan to preserve and protect the nature of the Motherland, to care for its flora and fauna. Today, every child of Azerbaijan should look at the environment with intelligent eyes, enjoy nature, and stand guard of the motherland's nature. The nature of our motherland is such a beautiful work of art given to us by the great God that it is at least unfair to spoil this work and treat it indifferently. The national leader of the Azerbaijani people, Heydar Aliyev, during his leadership of our country, used all opportunities to protect the nature of Azerbaijan and did a lot of work in the direction of covering our homeland with greenery. Thanks to the foresight of the great leader Heydar Aliyev, the forest lanes were expanded in our country, and the construction of new parks was kept in mind.

Conclusion: *The COP – 29 is very important and one of the most important events in the world in the fight against climate change. The fact that Azerbaijan was chosen as the host for this event by a unanimous decision among the countries of the Eastern European Group is an indication of high confidence in our country. Azerbaijan has already gained a positive enough image in the field of hosting international events. The decision to hold the event in Azerbaijan is also important because it was made two and a half months after the local anti-terrorist measures of Azerbaijan. This indicates the support of the world community for the steps taken by Azerbaijan. This event, in addition to being an oil and gas country, will prove to the whole world how much Azerbaijan sees the green economy as a priority area. Holding the event in Baku will give a great impetus to the further increase of the reputation of Azerbaijan and the direct and easy delivery of the country's realities to the world community.*

References

1. *https://president.az/en*
2. *https://xalqqazeti.az/en*

Pedagogical sciences

THE USE OF EDUCATIONAL GAMES AS A MEANS TO PROMOTE BETTER LEARNING

Muzaparova D.Sh.
m.p.s., teacher
Sovetova G.S.

Abstract

The use of educational games is gaining popularity as a method for improving learning outcomes. Educational games engage students by incorporating information and challenges into a game format, offering authentic problem-solving experiences and quick feedback. This interactive approach not only makes learning more enjoyable but also helps reinforce concepts and skills in a practical and memorable way. The purpose of this article is to analyze the opinions and preferences of various stakeholders, including students, teachers, and parents, regarding the use of educational games in the learning process. This comprehensive article provides valuable insights into students' tastes and their views on educational games, highlighting their preferences for different types of games and the specific features they find most beneficial for their learning. Moreover, this article examines the effectiveness of educational games in enhancing cognitive skills, such as critical thinking, creativity, and collaboration, by reviewing recent studies and case examples. It also explores the role of educational games in addressing diverse learning styles and needs, making education more inclusive and accessible. In addition to student perspectives, the article delves into teachers' experiences with integrating educational games into their curriculum. It discusses the challenges they face, such as aligning games with educational standards and managing classroom dynamics, as well as the strategies they employ to overcome these obstacles. The insights gathered from teachers provide a comprehensive view of the practical applications and potential hurdles in implementing educational games. Overall, this article aims to provide a well-rounded perspective on the use of educational games, offering recommendations for educators, game developers, and policymakers to optimize the integration of these tools in educational settings. By leveraging the potential of educational games, we can create more engaging, effective, and enjoyable learning experiences for students.

Keywords: *educational games, methodology, modern technologies, EFL, foreign language.*

Literature Review:

Conducting integrated educational games is an effective way to introduce modern technologies into the educational process, which helps to maintain students' interest in classes and encourage interaction with peers. Educational games provide students with skills that go beyond academic content, such as social interaction, problem-solving, and community building (Nearpod Team, 2023). Engaging games used in learning help students develop not only academic knowledge but also social and emotional skills such as collaboration, problem solving, and behavior management. Research shows that games are most effective when they are well organized and integrated into learning objectives (Hoa P. Nguyen, 2021). The problem of stimulating students' motivation to study a foreign language using the game method of teaching has been studied by outstanding scientists. In the methodology of teaching foreign languages, games are considered as situational practice, with the possibility of repeating speech patterns in situations similar to real ones (Feizova G.A, 2021).

The advantage of gamification is that the teacher does not need to create motivation using external factors. Games bring pleasure and enjoyment, so the integration of game elements creates motivation «from within». The possibilities of gaming educational technologies are only expanding thanks to global digitalization. For foreign language teachers, the use of gamification not only diversifies the forms of educational activities, but also makes educational materials more effective (Zherenkova O.M, 2022).

Research questions:

1. *How do students perceive the balance between educational games and traditional learning?*
2. *How do types of educational games affect motivation and learning outcomes?*

3. How does the personalized approach in educational games affect students' motivation and performance?

Methodology

The survey was conducted among students at Kazakh university of International Relationship and World Languages and among teachers at an online English language school. The survey was not anonymous; all questions were aimed at creating one picture about educational games, such as:

1. *Role in the educational process*
2. *Type of educational games*
3. *Difficulties*
4. *New functions in games*
5. *Motivation*
6. *Communication skills*
7. *Fluency*

Results:

1. Role in the educational process

66,7% most of the participants voted for equal roles between games and simple learning.

33,3% another minority believes that learning should not be placed on an equal footing or behind games.

0% of participants did not consider the game to be in first position.

2. Type of educational games

41,7% of people preferred to use electronic games, namely interactive games on smartphones.

25% a quarter of them prefer more traditional games using game cards with tasks.

25% another quarter preferred various role-playing games with a conversational focus.

8,3% the smallest number of people are interested in crosswords and puzzles.

3. Difficulties

25% of participants advocate that limited access to the Internet is the most important disadvantage.

50% almost half voted for limited time to study.

8.3% a small part believes that games do not provide quality education.

33.3% of a participants believe that everything lies in technical aspects.

25% the latter are not at all satisfied with the results after the games.

4. New functions in games

50% half would like to personalize their study, an individual approach.

25% a quarter of them voted that games could help with adaptation to language level.

16,7% this is the percentage that participants want to combine with other materials, such as textbooks.

8,3% a small percentage want to work cooperatively with friends.

0% of people didn't vote for progress statistics.

5. Motivation

41,6% of participants are motivated by certain cash bonuses or awards.

41,6% the other part wants to receive prizes or certificates.

33,3% less than half enjoy ratings and try to succeed in it.

25% of participants motivated by bonuses from the process.

16,7% only a small percentage are motivated through weekly competitions

6. Communication skills

33,3% the creative part of people believe that various platforms for speaking practice.

25% of people believe that it requires self-expression.

25% conversational phrases help improve skills.

8,3% it improves the quality and level of teamwork.

8,3% of participants believe that games reduce fear and anxiety before the oral part.

7. Fluency

25% of participants believe that fluency develops through oral interaction.

25% of people believe that the lack of pressure in games helps develop fluency

41,7% Constant use of English and understanding of context lead to the development of fluent speech.

8,3% a small percentage believe that listening helps to increase speaking speed.

0% no one voted for the general atmosphere.

Conclusion

The survey explores preferences related to the use of educational games for learning a foreign language. It investigates the types of educational games that interest participants and the difficulties they may encounter when using such games. Furthermore, the survey assesses which types of rewards might be the most motivating for learners in the context of foreign language education and the role that the gaming aspect should play in the educational experience.

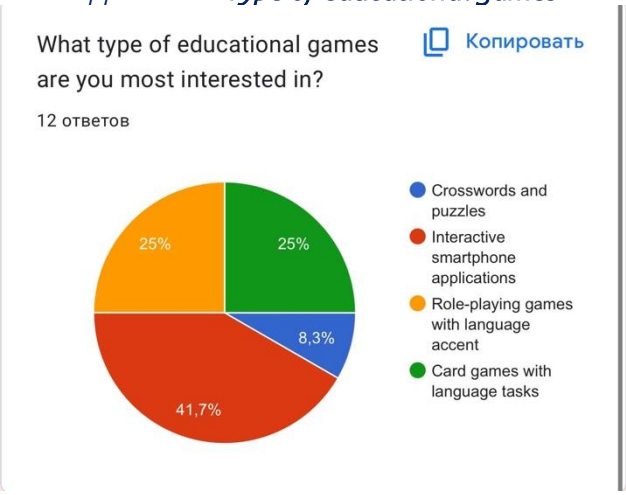
The survey delves into how games can cater to various learning styles and preferences. It also explores how games can enhance students' communication skills and contribute to language fluency.

In conclusion, this survey aims to gather insights into the preferences, challenges, and motivations of individuals who use educational games for foreign language learning. It provides valuable information for understanding how games can effectively support language education and create an engaging and immersive learning experience.

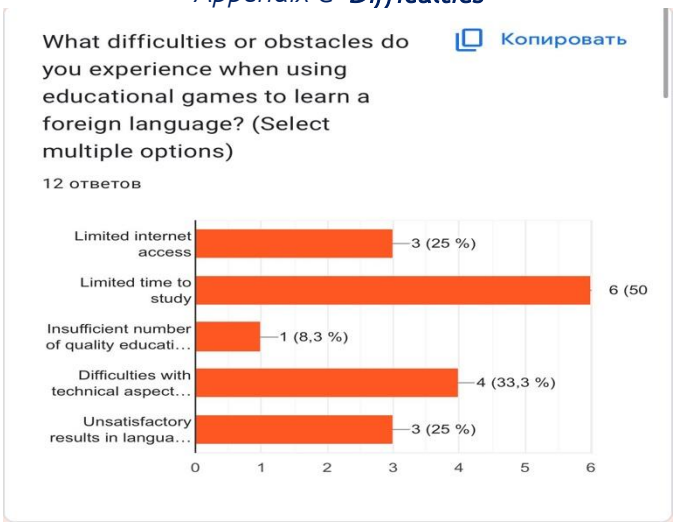
Appendix

*Appendix A- **Role in the educational process***

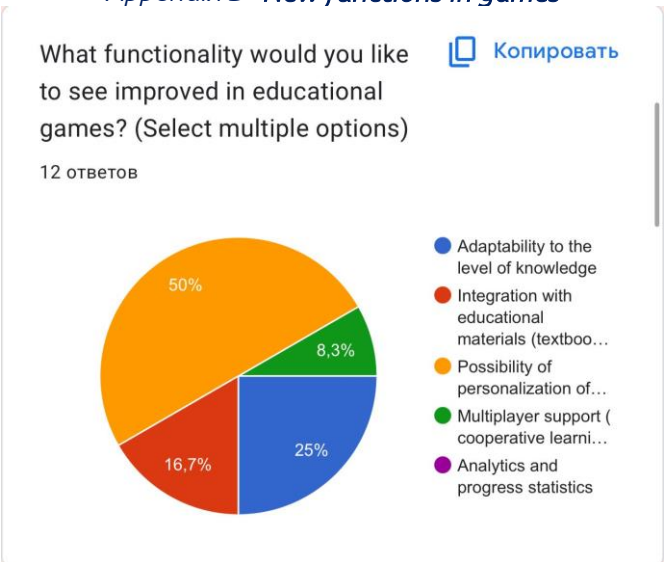
*Appendix B- **Type of educational games***



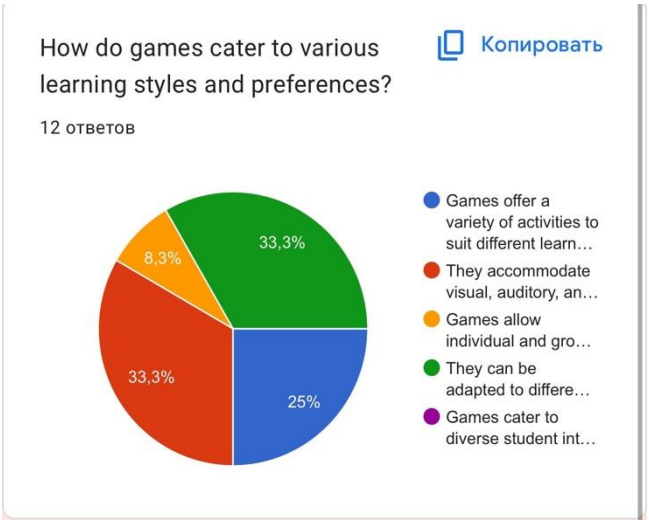
*Appendix C- **Difficulties***



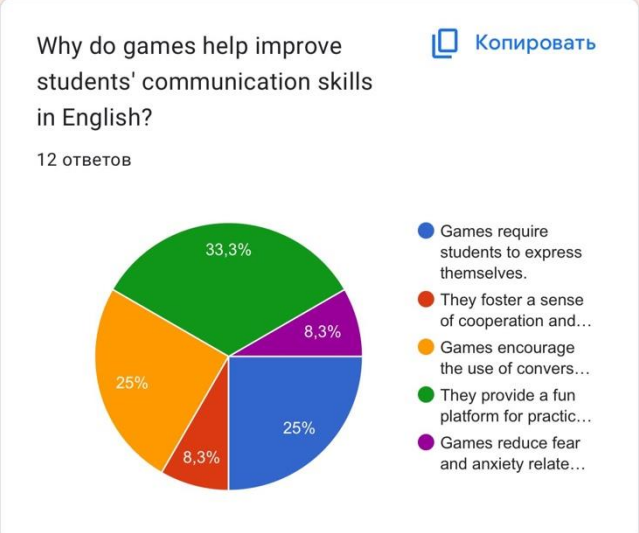
*Appendix D- **New functions in games***



*Appendix E- **Motivation***



*Appendix F- **Communication skills***



*Appendix G- **Fluency***

References

1. Nearpod Team (10/02/23). How to use educational games in the classroom. Why are games in the classroom important?. Retrieved April, 2024. https://nearpod.com/blog/educational-games-time-to-climb/

2. Hoa P. Nguyen (21/03/21). Game-based learning. How to Use Gameplay to Enhance Classroom Learning. Retrieved April, 2024. https://www.edutopia.org/article/how-use-gameplay-enhance-classroom-learning/

3. Feizova G.A. (2021). Using games in english lessons. Retrieved April, 2024. https://cyberleninka.ru/article/n/ispolzovanie-igr-na-urokah-angliyskogo-yazyka

4. Zherenkova O.M. (2022) Gamification of english lessons. Retrieved April, 2024. https://elib.bsu.by/bitstream/123456789/293796/1/Жеренкова%20О.М._ГЕЙМИФИКАЦИЯ%20УРОКОВ%20АНГЛИЙСКОГО%20ЯЗЫКА.pdf

Philological sciences

ETHNIC STEREOTYPES AND THEIR REALIZATION IN ENGLISH, AMERICAN, FRENCH AND RUSSIAN PICTURES OF THE WORLD

Maria Sergeevna Lukanova
Autonomous non-profit organization
Comprehensive School of the Centre for Pedagogical Excellence
Maria Alexandrovna Beley
PhD in philology, Associate Professor, I. Kant Baltic Federal University,
14, A. Nevskogo str. 236041, Kaliningrad, Russia.
ORCID ID: https://orcid.org/0000-0002-5189-5866

Abstract

The aim of the work is to identify the main parameters of cultures, to study the interaction between the concepts of stereotype and national character, to identify the features of the reflection of national culture in stereotypes, to consider some features of the notion 'concept', to conduct a survey on the topic 'ethnic stereotypes', to identify the features of national characters, concepts key to each nation and describe the results obtained. The results of the research were obtained by questioning 188 respondents, native speakers of Russian, French, English and American mentalities. The relevance of the topic is caused by the processes of globalization and intercultural integration in Europe and around the world, as well as the interest of researchers in the interaction of language, culture, psychology of the people. The present work contributes to the education of tolerant attitude to the carriers of other mentality in the context of dialogue of cultures, as well as the resolution of cultural contradictions and cognitive conflicts in the process of intercultural communication.

Keywords: *stereotype, ethnic stereotype, autostereotype, heterostereotype, national character.*

Each language views the world in its own way, has its own way of conceptualizing it. Each people, each nation has its own ideas about the surrounding world, about people, about representatives of another culture. In society, certain stereotypes are formed, both about themselves (autostereotypes) and about representatives of other linguistic and cultural space (heterostereotypes). In the modern information age, contacts between people, nations, cultures are extremely intensified, a multicultural, multi-ethnic, multi-confessional society is typical, which needs successful, constructive communication between representatives of different mentalities. Current changes in social relations, means of intercultural communication require a detailed study of ethnic stereotypes in order to smooth interethnic misunderstandings and conflicts.

The object of research in our work is the national -cultural specificity of verbalization of reality of representatives of French, English, American and Russian mentalities (on the example of questionnaires of 47 French, 47 English, 47 American and 47 Russian respondents), as well as the expression of the concept 'Motherland' in French, English and Russian languages. The subject of the study is a comparative-comparative analysis of cultures and their content of the speakers of French, English, American and Russian mentalities

The following methods were used in the course of the research: method of studying dictionary definitions, method of questionnaires, contextual analysis, component analysis, methods of corpus linguistics, some elements of statistical analysis (quantitative counting).

The material of the study was questionnaires of 188 respondents (47 French, 47 English, 47 Americans, 47 Russians) of both sexes, of different ages (from 20 to 65 years old), as well as dictionary articles devoted to the concept 'Motherland' in French, English and Russian.

The parameters by which the value orientations of a particular culture are determined, include attitudes to:

1. *Nature (control over nature and circumstances/fatalistic cultures)*
2. *Time (polychronic (Russia) and monochronic (USA, UK) cultures)*
3. *Space (cultures that do not respect personal space (Russia) and respect personal space (France,*

USA, UK)

4. Activity (past-oriented (Russia), future-oriented (France, USA, UK), present-oriented (Japan))

5. Nature of communication (high-contextual (Russia) and low-contextual (France, USA, UK) cultures.

6. The nature of argumentation during communication (linear/ holistic, factual/ intuitive, abstract/ concrete, valuing detachment/ involvement of the object in communication)

7. Personal freedom and autonomy of the individual (individualistic (France, USA, UK) and collectivistic (Russia) cultures) 8.

8. Rivalry (highly competitive (France, USA, UK), and low-competitive (Russia) cultures) 9.

9. Power (cultures that value equality (France, USA, UK) and hierarchy (Russia))

10. Human nature (sinfulness/positive nature)

In our study we consider the category of ethnic stereotype (national stereotype) as a generalized idea of typical traits that characterize this or that nation. Such a stereotype, denoting an entire ethnic or national group, assumes the presence of a certain trait in all its representatives. Therefore, both characteristics of another nation and everything that concerns one nation's ideas about another nation's culture as a whole can act as stereotypes: general concepts, norms of speech communication, behavior, categories, thought analogies, prejudices, superstitions, moral and etiquette norms, traditions, customs, etc. One of the central problems is the presence of truth in stereotypes. There is no unified opinion on this issue. At the everyday level they are perceived as an objective reality. The problem of finding out the grain of truth is inextricably linked to the question of the stability of stereotypes. If a stereotype is based on reality, it should be relatively stable; if it is entirely false, it should change depending on the historical, international and even internal political situation in a particular country. In accordance with this position, most authors insist on the variability of stereotypes or partial variability.

The content of national -stereotypes is conditioned by certain historical and cultural conditions. Due to the limited inter-ethnic communication, cognition of another ethnic group is often based on absolutisation and transfer of traits peculiar to its individual representatives to the national s as a whole. Ethnic consciousness not only absolutises some really existing ethnic properties, but also tends to attribute non-existent features to both 'its own' and 'foreign' ethnic groups. As a result, only an approximate, simplified idea of the main properties and characteristics of another ethnic group is formed. The qualities attributed to one or another people in some periods of its history may change or disappear in other periods. Ethnic consciousness implies not only a statement of the specificity of another ethnic group, but also an emotional-affective attitude towards it, expressed in its positive, negative or neutral evaluation. National stereotypes are often emotionally marked - sympathies or antipathies, they often serve as a policy tool (Grishaeva, Tsurikova, 2008:153).

National stereotypes are usually divided into autostereotypes and heterostereotypes. Autostereotypes reflect what people think about their own people. They are an important part of a nation's self-consciousness and form an idea of the behavior of the representatives of their national s. 'I am a part of my people, and I should be like my people' - such a position contributes to the unification of the nation. The autostereotype is characterized by idealizing one's own people, endowing them with positive qualities. Turning one's own ethnic group into a reference can become, under certain conditions, the basis for the formation of high inadequate self-esteem, i.e. hypertrophy of positive characteristics of the representatives of one's ethnic group, as well as in the assertion of the superiority of one's culture. And at the same time, the autostereotype 'justifies' the existing negative qualities of the 'own' ethnic group.

Heterostereotypes are perceptions of another nation. They are often connected with exaggeration of negative qualities of some representatives of another ethnic group and transferring them to all representatives of this ethnic group. As a result, antipathies towards another ethnic group, prejudice against it may arise, which, when consolidated, turn into a negative ethnic stereotype.

During the study of ethnic autostereotypes and heterostereotypes we developed a questionnaire and interviewed 188 respondents. The questionnaire asked the following questions:

1. *Gender (optional)*
2. *Age (optional)*
3. *Education (optional)*
4. *How do you imagine a typical Russian to be?*
5. *How do you imagine a typical Frenchman to be?*
6. *What do you imagine a typical Englishman to be like?*
7. *What do you imagine a typical American to be like?*

8. *What features of the Russian national character do you find most attractive?*
9. *What traits of the French national character do you find most attractive?*
10. *What traits of the English national character do you find most attractive?*
11. *What traits of American national character do you find most attractive?*
12. *What traits of Russian national character do you find unacceptable?*
13. *What traits of French national character do you find unacceptable?*
14. *What traits of the English national character do you find unacceptable?*
15. *What traits of American national character do you find unacceptable?*
16. *What concepts (concepts) are key to your culture?*

Based on the results of the survey we made a number of conclusions and generalizations:

The bearers of French mentality belong to the individualistic type of culture. The main values of individualistic cultures are: respect for human rights, high value of human life. People of France are characterized by analytical mind (52%), breadth of imagination (68%), persistent inquisitiveness and courage in learning about life (46%)- autostereotypes .French people are optimistic (65%), cheerful (92%), sociable (83%) people who love a joke. They are witty (92%) and sarcastic (53%), cheerful (68%)and sincere, frank (52%) and boastful (70%), affectionate (81%)-autostereotypes .Revolutionary phrases about 'liberty', 'equality', 'fraternity', 'national honor', 'patriotism' are easily imposed on the French by other peoples (Russians, British and Americans).

These concepts are heterostereotypes of the carriers of French mentality .The French are gallant (93%), sceptical (34%) and calculating (22%), cunning (38%), and resourceful (41%), great gourmets (69%). At the same time, they are enthusiastic (31%), trusting (37%), generous (28%), and romantic (65%)-hetero-hereotypes. Among the key concepts peculiar to French culture respondents named freedom, equality, fraternity, homeland, love for loved ones, humour, French art (painting, music, literature, theatre, cinema and sculpture), French cuisine, French haute couture.

Turning to the study of national stereotypes of representatives of the English mentality, it should be noted that, the most frequently attributed character trait to the English is their sense of national superiority (97%)-heterostereotype. Obsession with sport (72%) is another stereotype often attributed to the people of England. The English are hard-working (36%), balanced (65%), friendly (32%), alert (28%) and decent people (69%). Their ideals are independence (47%), adherence to tradition (94%), continuity (92%), education (74%), inner self-respect (54%), honesty and unselfishness (65%), tact (77%), elegance of manners (83%,) refined politeness (72%), ability to sacrifice time and money for a good cause (66%), ability to lead and obey (73%), perseverance in achieving the goal (63%).

It is also worth noting the paradoxes of the English national character, which include a strange combination of conformism (62%) and individualism (45%), eccentricity (38%) and politeness (42%), friendliness (36%) and reticence (57%), aloofness (68%) and helpfulness (32%), simplicity (21%) and snobbery (83%) ('snobbery'). Among the key concepts of English national culture, respondents named tradition, material well-being, continuity, English sense of humour, good manners, good-naturedness, and homeland.

According to the respondents, the distinctive feature of the American national character is hard work (78%), business (91%), and practicality (90%). 'Success' (96%) is a cherished goal in life for them. The carriers of the American mentality belong to the individualistic culture of the 'masculine' (masculine) type. In masculine cultures, the value of material things, power and representation is high, and the motivation to achieve is stronger. Representatives of masculine cultures see the meaning of life in work, and tend to work hard.

The overwhelming majority of respondents (78%) noted the smiling nature of Americans.Americans are characterised by: self-confidence (69%), disdain for everything non-American (45%), overestimation of their strengths and abilities (81%)-heterostereotypes. Simplicity and naivety really distinguish the inhabitants of the United States (this was noted by both European and American respondents).

In the vision of Russians, French and English, the American is a patriot (97%), business (91%), freedom-loving (63%), calculating (58%), practical (65%), purposeful (74%), hardworking (78%), sociable (69%), cheerful (62%), relaxed (79%) person . Among the key concepts of American national culture, the respondents named love for the homeland, humour, jazz, the 'American dream', businesslikeness, entrepreneurship, and law-abidingness.

Turning to the problem of national stereotypes related to the carriers of Russian mentality, it is worth noting that among the autostereotypes Russian respondents noted that their typical compatriot is kind (82%), patient (43%), hospitable (71%), hardworking (42%), lazy (57%), friendly (38%), broad-

minded (49%), patriot (63%), trusting (36%), open-minded (31%).

Among the most characteristic features of Russians, foreign respondents noted 'mysterious (enigmatic) Russian soul' ('mystérieuse (énigmatique) âme russe') (77%). Among the key concepts of Russian national culture respondents noted hospitality (88%), generosity (63%), laziness (78%), kindness (56%), versatility, openness, interest in the world around them, 'mysterious Russian soul' (87%), and the Motherland. The respondents also noted the sense of community, honoring parents, ancestors, loyalty to duty, word, love, Russian traditions, faith, truthfulness, justice and readiness to defend the truth, belligerence, dissatisfaction, rebelliousness of the Russian soul seeking for the ideal and justice.

In the works of many researchers, the national character is presented as a specific set of real features of the nation. Noting the national specificity of each nation, it includes: self-consciousness, habits, tastes, traditions associated with national feelings, national culture, everyday life, national pride and national stereotypes in relation to other nationalities. It turned out that the majority of people have very stable stereotypes in relation to a certain national character, i.e. the belief that representatives of some nations demonstrate rather persistent ideas about the existence of specific complexes of traits in other nations. Importantly, these stereotypes often depend on how that nation 'behaves' in a given time period.

Every ethnic group (tribe, nation, any group of people connected by a common origin and distinguished by certain traits from other human groups) has its own group identity, which captures its - real and imagined - specific traits. Any nation is intuitively associated with one image or another.

No matter how certain ethnic stereotypes are formed, over time they acquire over time the character of a norm, transmitted from generation to generation as something indisputable and self-evident. The historical tradition embodied in historical writings, literature, customs, and the conservatism of the upbringing system have an impact here. The importance of upbringing is particularly great. Numerous studies show that most people internalize prejudices in childhood, before they have the opportunity to think critically about the information they receive.

Of course, in each individual case, national and ethnic relations have certain specifics, but there are some invariable reasons that aggravate international relations. In particular, the following can be named: the processes of formation of national self-consciousness, the problem of language and the possibility of manifestation of national culture, therefore the factors that determine the national identity of a person.

References

1. Bondarenko A. G. Sociological research: Survey methodology. Textbook / VolgGTU, Volgograd, 2006. - 64 c.

2. Grishaeva L. I., Tsurikova L. V. Introduction to the Theory of Intercultural Communication. - Moscow: Academy, 2008. 352 p.

3. Krasnykh V. V. 'Native' among 'strangers': myth or reality? M. Gnosis, 2003.- 322 p.

4. Ter-Minasova S. G. Language and Intercultural Communication. M.: Slovo, 2000.- 624 p.

5. Wierzbicka A. Comparison of cultures through lexis and pragmatics. - M.: Vysshaya Shkola, 2001. - 342 c.

Physical sciences

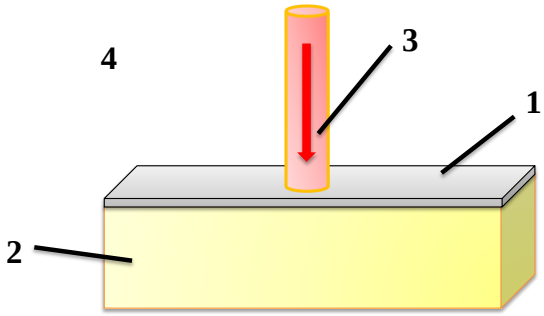
MODELING OF THE TEMPERATURE FIELD IN THE PROCESSES OF LASER THERMOCHEMICAL SHAPING OF THE DIAMOND SURFACE

Aliaksand Kupo
Francisk Skorina Gomel State University, Gomel, Belarus

Currently, the processing of diamonds (natural or synthetic) in microelectronics technologies is also carried out using the thermochemical method. The method is based on the use of the chemical properties of diamond [1, 2]. In this case, the surface of the diamond is first coated using vacuum methods with a metal coating capable of dissolving carbon (molybdenum is most often used). Hydrogen can be used as such a gas, capable of creating volatile compounds with carbon atoms [3]. In this process, the metal acts as a catalyst, through which carbon can form compounds with hydrogen, its mixtures or water ferry. [4].

Laser radiation forms an axisymmetric surface heat source [5], which makes it possible to solve a three-dimensional problem in a cylindrical coordinate system, which reduces it to a two-dimensional one, but complicates the form of the Laplace operator [6].

Thus, a nonstationary nonlinear problem of heat and mass transfer in a three-layer system "hydrogen – metal – diamond" is considered. There is no convective heat exchange with the external environment, the system is thermally insulated. In the general case, solving the problem of heat and mass transfer in the described system is reduced to solving a system of differential equations, including heat equations, with mixed boundary conditions. The experimental design is shown in Fig. 1



1 – metal; 2 – diamond; 3 – laser radiation; 4 – gas environment
Fig. 1 – Scheme of laser thermochemical processing of diamond

For example, at the boundaries "hydrogen – metal" and "hydrogen – diamond", boundary conditions of the second kind are implemented.

$$x = 0: \begin{cases} -\lambda_1(T_1) \cdot \dfrac{\partial T_1}{\partial x} = I_0, & 0 \le r \le R_0 \\ \lambda_1(T_1) \cdot \dfrac{\partial T_1}{\partial x} = 0, & r \ge R_0 \end{cases} \quad (1)$$

$$x = S_2: \ \lambda_2(T_2) \cdot \frac{\partial T_2}{\partial x} = 0 \quad (2)$$

where: R_0 – radius of the laser spot on the metal surface, S_2 – coordinate of the lower boundary of the diamond-hydrogen interface, I_0 – power density of the heat source.

At the "metal – diamond" interface, the coordinate of which is $x = S_1$, boundary conditions of the fourth kind are implemented:

$$x = S_1: \ \lambda_2(T_2) \cdot \frac{\partial T_2}{\partial x} = \lambda_1(T_1) \cdot \frac{\partial T_1}{\partial x} \quad (3)$$

The presented differential problem can be approximated by a finite-spacing scheme performed with first order accuracy in time t and second order in spatial coordinates x and r. In this case, the implicit difference scheme was chosen since it is the most stable, i.e. allows you to integrate the boundary value problem with any small difference time step.

The developed model makes it possible to determine the axisymmetric temperature distribution in a two-layer system ("metal – diamond") at any time in a wide range of laser radiation intensities for arbitrary dependences of thermophysical parameters on temperature, as well as for various types of metal coating.

Analysis of modeling results in the range of heat source power densities $I_0 = 10^4–10^7$ W/m2 and

metal coating thicknesses h = 0,01 – 1 μm allows us to establish the most effective thermochemical processing modes and ensure the diamond removal rate (1.2–1.8) ·10^{-1} kg/(m^2·s), bypassing the graphitization stage, with processing accuracy (10–30)·10^{-6} m.

References

1. Grigoriev A.P., Lifshits S.U., Shamaev P.P. The mechanism of carbon hydrogenation in the presence of nickel, iron and platinum // Kinetics and catalysis, – 1977. – T. 18, No. 4. – P.948-952. [Published in Russian]

2. Prokhorov, A.M. Interaction of laser radiation with metals / A. M. Prokhorov [et al.]. – Bucharest: Academiei; Moscow: Nauka, 1988. – 537 p. [Published in Russian]

3. Study of the influence of processing parameters on the course of surface nanoprocesses during the formation of synthetic diamonds / V. A. Emelyanov, E. B. Shershnev, S. I. Sokolov, A. N. Kupo // Proceedings of the Gomel State University named after F. Skorina. Ser.: Natural Sciences. – 2021. – No. 6 (129). – pp. 159–163.

4. Thermochemical laser processing of diamond single crystals / V. A. Emelyanov, E. B. Shershnev, A. N. Kupo, S. I. Sokolov // Quantum electronics: materials of the XIII International. scientific-technical conference, Minsk, November 22–26, 2021 / BSU, Research Institute of Applied Physical Problems named after. A. N. Sevchenko BSU, Institute of Physics named after. B. I. Stepanova NAS of Belarus, Belarusian Republican Foundation for Basic Research; [editor-in-chief: M. M. Kugeiko (chief editor), A. A. Afonenko, A. V. Barkova]. – Minsk: BSU, 2021. – P. 382-285. [Published in Russian]

5. Kozlov, V.P. Two-dimensional axisymmetric unsteady problems of heat conduction / Ed. A.G. Shashkova. – Mn.: Science and Technology, 1986. – 392 p. [Published in Russian]

6. Kuznetsov G.V., Sheremet M.A. Difference methods for solving heat conduction problems: textbook. / G.V. Kuznetsov, M.A. Sheremet. – Tomsk: TPU Publishing House, 2007. – 172 p. [Published in Russian]

Technical sciences

UDC 669-1

INVESTIGATION OF THE DISTRIBUTION OF NON-FERROUS METALS DURING THE LEACHING OF A STUB

Dosmukhamedov Nurlan Kalievich
Candidate of Technical Sciences, Professor, Satbayev University, Almaty, Kazakhstan
Argyn Aidar Abdilmalikuly
PhD, Associate Professor,
Zhezkazgan University named after O.A. Baikonurov, Zhezkazgan, Kazakhstan
Zholdasbay Erzhan Yessenbayuly
PhD, Associate Professor,
Zhezkazgan University named after O.A. Baikonurov, Zhezkazgan, Kazakhstan

Abstract

Laboratory experiments on the leaching of the stub with sulfuric acid were carried out in the work. The optimal parameters of the leaching of the stub have been established: τ=40 min., S:L=0.9, t=40 °C. Based on the results of laboratory experiments, studies of the distribution of copper, lead, zinc and arsenic between leaching products were carried out. The ongoing research is part of the developments aimed at building a general concept of an integrated technology for processing fine dust from copper smelters of Kazakhmys Corporation LLP.

Keywords: *copper, lead, zinc, arsenic, stub, leaching, distribution.*

Introduction

The linear model of obtaining metals from primary sulfide raw materials of low quality, which dominates copper production, does not meet modern requirements, therefore, in recent years, the circular economy model within the framework of the Zero waste concept – "zero waste" has been widely used in the global economy. Waste management systems in many countries already comply with the principles of the circular economy [1].

The increase in the content of toxic and carcinogenic arsenic [2-4] in copper concentrates [5, 6] significantly affected its distribution between the gas, slag and matte phases in the melting processes [7]. As a result, large volumes of substandard intermediates, recycled materials and man-made waste with a high content of arsenic were formed. This, on the one hand, has increased their negative impact on the environment and public health, on the other, hinders their further processing. Arsenic emissions, especially As2O3, cause serious environmental pollution and significant harm to human health. Arsenic control has become one of the important problems for all copper and lead smelters [8].

The materials characterized by a complex chemical composition containing a significant amount of arsenic include fine dust from electrofilters obtained by converting copper matte. An important prerequisite for the organization of a separate production for processing fine dust of copper smelting production is their multicomponent nature, %: 35-50 Pb; 5-7 Cu; 6-9 Zn; 4-6 Fe; 8-13 As; others. The value of dust is enhanced by the presence of dual-use metals in them: rhenium, osmium, selenium, etc. The increase in arsenic content (up to 13%) in the dust of copper smelters in Kazakhstan hinders the development of new highly efficient technologies.

Various variants of pyro- [9-11] and hydrometallurgical [12-15] methods have been developed for processing, a number of which have been successfully applied in practice in recent years.

In recent years, special attention has been paid to hydrometallurgical technologies for the production of non-ferrous and rare earth metals from copper smelting dusts. The main operation in the processing of dust by hydrometallurgical methods is leaching using solutions of acids (H_2SO_4, HNO_3, HCl), alkalis (NaOH, NH_4OH) or acidified salts ($FeCl_3$, $Fe_2(SO_4)_3$). All of these methods are described in sufficient detail in the technical literature [12-15] and do not require special comment.

Hydrometallurgical dust processing methods have a number of technological and environmental advantages over pyrometallurgical methods. They do not require large capital expenditures, provide high complexity of the use of raw materials, selectivity of extraction of valuable components and the absence of dust and gas emissions [12, 13]. However, during hydrometallurgical (sulfuric acid) processing of

copper smelting dust, it is inevitably necessary to solve the problems of leaching of insoluble non-ferrous metal compounds (ferrites, sulfides) and purification of the resulting sulfate solutions from iron and other impurities, in particular, from arsenic [13, 14, 15]. Therefore, in recent years, intensive research has been conducted on the use of other solvents for dust processing [14, 15].

The most common hydrometallurgical method of dust processing is sulfuric acid leaching, which is associated with the cheapness and availability of sulfuric acid. The lower solubility of lead sulfate compared to sulfates of other non-ferrous metals provides greater selectivity of hydrometallurgical schemes based on sulfuric acid.

The purpose of this work is to study the distribution of non–ferrous metals between leaching products. Establishment of optimal parameters of the process of leaching the stub with sulfuric acid.

Object and methods of research

The object of the study was a stub obtained after the reduction roasting of fine dust of the Zhezkazgan copper smelter with natural gas. The elemental composition of the candle end and the research methodology are described in detail in [16].

A chemical analysis method was used to determine the composition of the solutions. The initial stub was pre-ground to obtain a homogeneous fine fraction < 200 mesh (74 microns) and leached. The experiments were carried out at leaching time, min: 20; 40; 60, temperatures – 20, 40, 60, 80 ° C, various ratios of the solid phase to the liquid (S:L) – 0,5; 1,0; 1,5; 2,0.

To obtain reliable accurate results, each experiment was repeated three times. Based on the results of the output of products and elemental composition, the material balance for each experiment was calculated.

The obtained data were used to select and justify the optimal process parameters that ensure the maximum distribution of metals between the products of leaching lead into cake, and copper and zinc into solution.

The results of experiments on the leaching of the stub with sulfuric acid

From the results obtained, it was found that the best technological indicators providing a comprehensive solution – high selective concentration of metals in the products of leaching of the cinder, are achieved at the following optimal parameters: temperature – 40 ° C, process time – 40 min., S:L = 0.9. At the selected optimal parameters, the content of copper and zinc in the solution is 37.2 and 75.8 g/l, respectively. The lead content in the cake is 91.2%. The extraction of lead in the cake is 98%. Arsenic almost completely passes into solution.

Based on the results of the chemical composition and the number of yields of leaching products, the material balance of the experiment was calculated. The results of the experiment showed good convergence among themselves (+/-1.2% abs.).

Table 1 shows the calculated average material balance of the stub leaching process at optimal process parameters.

Table 1

The material balance of the leaching of the stub: τ=40 min., S:L =0.9, t=40 °C

Product Name	Quantity,		Cu		Pb		Zn		As	
	g	%	g	%	g	%	g	%	g	%
Uploaded:										
Cinder	100	55,65	7,15	7,15	58,91	58,91	13,89	13,89	0,32	0,32
H_2SO_4	79,70	44,35								
Total:	**179,70**	**100**	**7,15**		**58,91**		**13,89**		**0,32**	
Received:										
Cake	63,31	35,23	0,26	0,41	57,32	90,53	0,07	0,11	0,03	0,05
Solution	116,39	64,77	6,89	5,92	1,59	1,37	13,82	11,87	0,29	0,25
Total:	**179,70**	**100**	**7,15**		**58,91**		**13,89**		**0,32**	

Fe		O_2		Re		Others		Total:	
g	%	g	%	g	%	g	%	g	%
Uploaded:									
3,17	3,17	15,53	15,53	0,22	0,22	0,81	0,81	100,00	100
						79,70	100	79,70	100
3,17		**15,53**		**0,22**		**80,52**		**179,70**	
Received:									
0,37	0,58	1,23	1,94	0,011	0,02	4,03	6,36	63,31	100
2,81	2,41	14,30	12,29	0,210	0,18	76,49	65,72	116,39	100
3,17		**15,53**		**0,221**		**80,52**		**179,70**	

High indicators for the distribution of metals between leaching products are achieved due to the complete destruction of ferrites, achieved by reducing roasting with natural gas of the initial dust, ensures their conversion into easily soluble copper and zinc oxides, which easily dissolve and pass into solution during leaching.

Figure 1 shows data on the distribution of Cu, Pb, Zn, As between leaching products obtained at optimal process parameters: T = 40 °C, S:L =0.9, τ = 40 min.

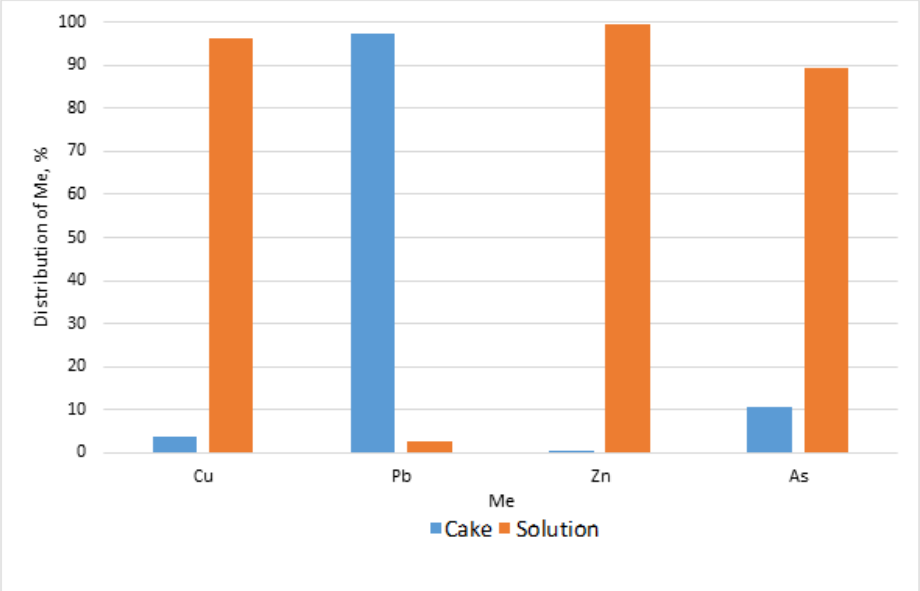


Fig.1. Distribution of metals between the lead cake and the solution at T = 40 ° C, τ = 40 min., S:L = 0.9.

Conclusions:

The optimal parameters of the leaching of the stub have been established: τ=40 min., S:L=0.9, t=40 °C. Studies of the distribution of non-ferrous metals between leaching products at optimal parameters have been carried out. It is shown that with optimal parameters of the leaching process, a high distribution of metals in the solution is achieved: copper – 96.4%, zinc – 99.5%, arsenic – 89.5%, and lead in cake – 97.3%.

The solution obtained after leaching will be used for further studies to isolate copper and rhenium from it, and the lead cake will be used to produce rough lead. The ongoing research is part of the developments aimed at building a general concept of an integrated technology for processing fine dust from copper smelters of Kazakhmys Corporation LLP.

Source of financing. *The research was carried out within the framework of grant funding from the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan for 2023-2025 in the priority area "Geology, extraction and processing of mineral and hydrocarbon raw materials, new materials, technologies, safe products and structures" of the AP19676951 project: "Development of resource-saving, combined technology for complex processing of multicomponent dust of non-ferrous metallurgy to obtain commodity products".*

References

1. Vorotnikov AM, Lyzhin DN, Ipatova NS. Waste management system as an integral part of circular economy. Journal of economic research 2018;10:29-34.

2. Kobayashi, Y, Hirano S. Distribution and excretion of arsenic metabolites after oral administration of seafood-related organoarsenicals in rats. Metals 2016; 6(231). DOI:10.3390/met6100231

3. Dosmukhamedov N, Kaplan V. Efficient removal of arsenic and antimony during blast furnace smelting of lead-containing materials. JOM 2017;69:381-387.

4. Zhong DP, Li L, Tan C. Separation of arsenic from the antimony-bearing dust through selective oxidation using CuO. Metall Mater Trans B 2017;48:1308-1314.

5. Yazawa A, Azakami T. Thermodynamics of removing impurities during copper smelting. Can Metall Quart 1969; 8:257-261.

6. Nakazawa S, Yazawa A, Jorgensen FRA. Simulation of the removal of arsenic during the roasting of copper concentrate. Metall Mater Trans B 1999;30:393-401.

7. Swinbourne DR, Kho TS. Computational thermodynamics modeling of minor element distributions during copper flash converting. Metall Mater Trans B 2012; 43:823-829.

8. Orac D, Laubertova M, Piroskova J, Klein D, Bures R, Klimko J. Characterization of dusts from secondary copper production. J Min Metall Sect B - Metall 2020;56(2):221-228. DOI:10.2298/JMMB190820011O

9. Fry KL, Wheeler CA, Gillings MM, Flegal AR, Taylor MP. Anthropogenic contamination of residential environments from smelter As, Cu and Pb emissions: Implications for human health. Environmental Pollution 2020; DOI:10.1016/j.envpol.2020.114235

10. González A, Font O, Moreno N. Copper flash smelting flue dust as a source of germanium. Waste Biomass Valor 2017;8:2121–2129. https://doi.org/10.1007/s12649-016-9725-8

11. Chen J, Zhang W, Ma B, Che J, Xia L, Wen P, Wang Ch. Recovering metals from flue dust produced in secondary copper smelting through a novel process combining low temperature roasting, water leaching and mechanochemical reduction. Journal of Hazardous Materials 2022;430. DOI:10.1016/j.jhazmat.2022.128497

12. Chen Y, Liao T, Li G, Chen B, Shi X. Recovery of bismuth and arsenic from copper smelter flue dust after copper and zinc extraction. Miner Eng 2012;39:23-28.

13. Bakhtiari F, Atashi H, Zivdar M, Seyed Bagheri SA. Continuous copper recovery from a smelter's dust in stirred tank reactors. Int J Miner Process 2008;86:50-57.

14. Mohagheghi M, Askari M. Copper recovery from reverberatory furnace flue dust. Int J Miner Process 2016;157:205-209.

15. Vitkova M, Ettler V, Hyks J, Astrup T, Kribek B. Leaching of metals from copper smelter flue dust (Mufulira, Zambian Copperbelt). Appl Geochem 2011;26:263-266.

16. Досмухамедов Н.К., Жолдасбай Е.Е., Ичева Ю.Б. Извлечение Cu, Zn, Pb из огарка от обжига тонкой конвертерной пыли медного производства выщелачиванием серной кислотой // Горный журнал Казахстана. 2024. №5. С.44-50.

ISBN

https://sconferences.com
info@sconferences.com