

Improving the efficiency of a cone crusher by investigating the key factors in its working process

Jonibek Mavlonov¹, Jasurjon Olimov^{1,a)}, Sohibjon Shirinov¹, Saidikrom A'zamov

¹Navoi State University of Mining and Technologies, Navoiy, Uzbekistan

²Andijan State Technical Institute, Andijan, Uzbekistan

^{a)} Corresponding author: olimovjasur2328@gmail.com

Abstract. At present, crushing processes are one of the most energy-intensive operations, accounting for more than 50-60% of the total energy resources of processing enterprises. Therefore, in the process of ore preparation and development, it is urgent to select equipment to improve energy efficiency, use high-performance equipment with large unit capacity, strengthen crushing processes and develop technical solutions. Therefore, modern experimental design methods were used to study the energy consumption of cone crushers under the influence of many factors, and a high-precision mathematical model was proposed. Experimental experiments were conducted using the main parameters (crushing (fractionation) coefficient, compression force, cone rotation speed and load), as well as optimization by calculating the influence of the main factors, resulting in a 20% reduction in energy consumption, and the main priority tasks for achieving energy efficiency for an optimal work process were identified.

INTRODUCTION

Energy consumption in cone crushers depends on many factors, including ore hardness, grain size, loading uniformity, rotation frequency, chamber geometry, technical condition of the crushing zones, and other important factors. It is important to determine the relationship between these factors and create an effective operating mode. Rational use of energy not only increases production efficiency. In this regard, an in-depth study of energy consumption in cone crushers, its assessment based on mathematical and experimental models, and the development of energy-saving modes are among the urgent scientific and practical tasks of modern mining science.

EXPERIMENTAL RESEARCH

To determine the specific energy consumption of a crusher (energy consumption per unit volume of ore) and assess its energy efficiency, it is necessary to study its energy characteristics and the relationship between the crusher's operating conditions and its average power consumption. Because, using a numerical experimental method using an analytical model, the power consumed and specific energy consumption are determined depending on the parameters of the crushed material and its operating modes [1-5]. In the research work, the following formula (1) was used to determine the consumed electrical energy.

$$N_m = \frac{\sigma_{sj}^2 \pi D_k}{0,01224 \eta E} (D_{sv}^2 - d_{sv}^2) n K_{pr} \quad (1)$$

Where ; σ_{sj} - material time during squeeze strength, MPa; D_k - crushing cone base diameter, m; E - material modulus of elasticity, MPa; η - of the material mechanic efficiency; D_{sv} and d_{sv} - suitable accordingly starting material and chopped of the product average size, m; n - grinding cone rotation frequency, rpm; K_{pr} - crusher size, design, grinding process dynamics and grinding camera filling level into account received without general correction coefficient [4].

Conical grinder volumetric productivity formula (2) following expression according to is determined .

$$V = \pi d_{sb} D_k \ln \mu \quad (2)$$

Where ; $l = D_k/12$ - parallel zone height ; μ - material crush coefficient .

Research on KMD-150 conical crushers have been performed, because this kind of grinder high reliability, high productivity, simple and easy service show to the characteristics has [6-10].

KMD-150 conical crusher technician features: productivity Q - 190-720 t/h; recommended done maximum power N_{max} - 220 kW; motor shaft speed n - 150-200 rpm; moving conical of the base diameter D_k - 1.078 m; discharge of the cavity width b - 0.01- 0.045 m; mechanical efficiency of crusher η - 0.85.

Crushed of the material parameters Muruntov to the mine suitable comes from: material time during compression power σ_{sj} - 60-130 MPa; material compression of strength average value σ_{sj} - 99 MPa; material modulus of elasticity E - 7000 MPa; the material soften coefficient m – 0.5; ore density r_m – 2.7 t/m³ what organization will reach [11-18].

Under study various parameters for electricity energy spending calculation for K_{pr} - crusher size and design descriptive general correction coefficient calculation need.

According to formula (1) K_{pr} value found:

$$K_{pr} = \frac{0,01224EN_m\eta}{\sigma_{sj}^2\pi D_k(D_{sv}^2-d_{sv}^2)n} \quad (3)$$

In terms of KMD-150 conical crusher for $D_{sv} = 60$ mm unloading of the cavity width 10 mm and crushed particles average size $d_{sv} = 20$ mm increases, coefficient $K_{pr} = 1.39$.

RESEARCH RESULTS

Crushed of the product size unloading of the cavity to the width assuming that the efficiency (Q) is equal to of the engine consumption made power (P) and conical grinder comparison energy consumption (W) grinding coefficient (i) to dependencies calculating will be released and in the table .

TABLE 1. Private energy spend fractionation to the coefficient connection.

Exit of the slot diameter d , m	Fragmentation coefficient i	Energy by $\sigma_{c\kappa} = 60$ MPa in compression consumption to be done power	Energy by $\sigma_{c\kappa} = 100$ MPa in compression consumption to be done power	Energy by $\sigma_{c\kappa} = 130$ MPa in compression consumption to be done power	Productivity Q , t/h	$\sigma_{c\kappa} = 60$ MPa in compression comparison energy expense	$\sigma_{c\kappa} = 100$ MPa in compression comparison energy expense	$\sigma_{c\kappa} = 130$ MPa in compression comparison energy expense
0.010	6.00	52.26	141.38	240.63	296.45	0.17	0.48	0.81
0.013	4.62	51.25	138.57	235.88	385.09	0.13	0.36	0.61
0.016	3.75	48.98	135.04	229.90	472.73	0.10	0.29	0.49
0.019	3.16	46.44	132.76	222.68	562.36	0.08	0.23	0.40
0.022	2.73	45.63	127.76	214.23	651.00	0.07	0.20	0.33
0.025	2.40	44.57	121.02	204.53	738.64	0.06	0.16	0.28
0.032	1.88	38.73	105.79	177.10	944.46	0.04	0.11	0.19
0.038	1.58	32.57	87.71	148.23	1123.73	0.03	0.08	0.13
0.045	1.33	24.07	66.07	108.28	1328.55	0.02	0.05	0.08

Based on the above table, it can be concluded that increasing the diameter of the discharge slot at the ore outlet of a cone crusher significantly reduces energy consumption. At the same time, energy consumption is considered to be small for ores with low strength [19-24].

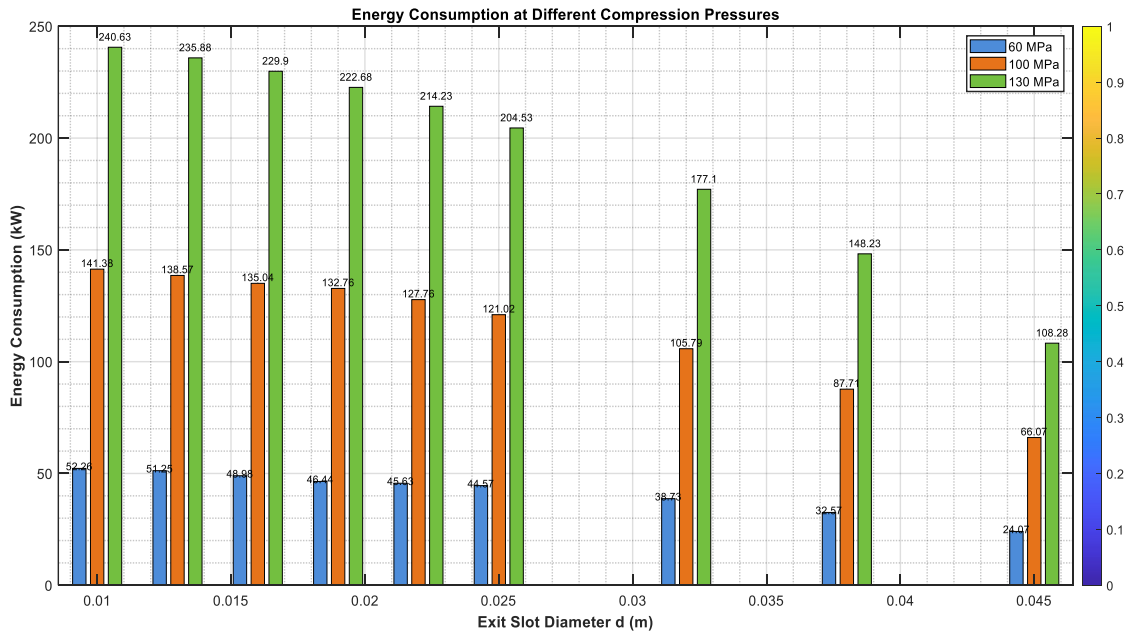


FIGURE 1. Marked energy spend fractionation to the coefficient connection.

Above from data come, it turns out that for $s_{\max} = 130$, crushing coefficient from 1.3 to 6 when changing crusher productivity from 1328 t/h to 296 t/h decreases; electricity driver by consumption to be done power 108 kW from 240 kW up to, comparative energy consumption and from 0.08 kW/t to 0.81 kW/t increases [25-54]. Typical energy spend source of the material pressure to the power dependency in the table 2 and Fig 2.

TABLE 2. Energy comparison consumption start of the material pressure to the power dependency.

Compression power $\sigma_{\text{сж}}$, MPa	In the coefficient power expense	In the coefficient power expense	In the coefficient power expense	Productivity at $i=1.9$	Productivity at $i=3.2$	Productivity at $i=4.6$	Comparison at $i=1.9$ energy expense	Comparison at $i=3.2$ energy expense	Comparison at $i=4.6$ energy expense
60	37.7	47.4	50.2	945.5	561.4	384.1	0.04	0.08	0.13
70	51.3	64.4	68.4	945.5	561.4	384.1	0.05	0.12	0.18
80	67.1	84.3	89.3	945.5	561.4	384.1	0.07	0.15	0.23
90	84.9	106.7	113.1	945.5	561.4	384.1	0.09	0.19	0.29
100	104.8	131.8	139.6	945.5	561.4	384.1	0.11	0.23	0.36
110	126.8	159.4	168.9	945.5	561.4	384.1	0.13	0.28	0.44
120	150.9	189.7	201.0	945.5	561.4	384.1	0.16	0.34	0.52
130	177.1	222.7	235.9	945.5	561.4	384.1	0.19	0.40	0.61

As can be seen from the above information, if the crushing coefficient is reduced, the energy consumption for the cone crusher also decreases proportionally. The crushing coefficient is of course determined based on the physical and chemical properties of the ore [7].

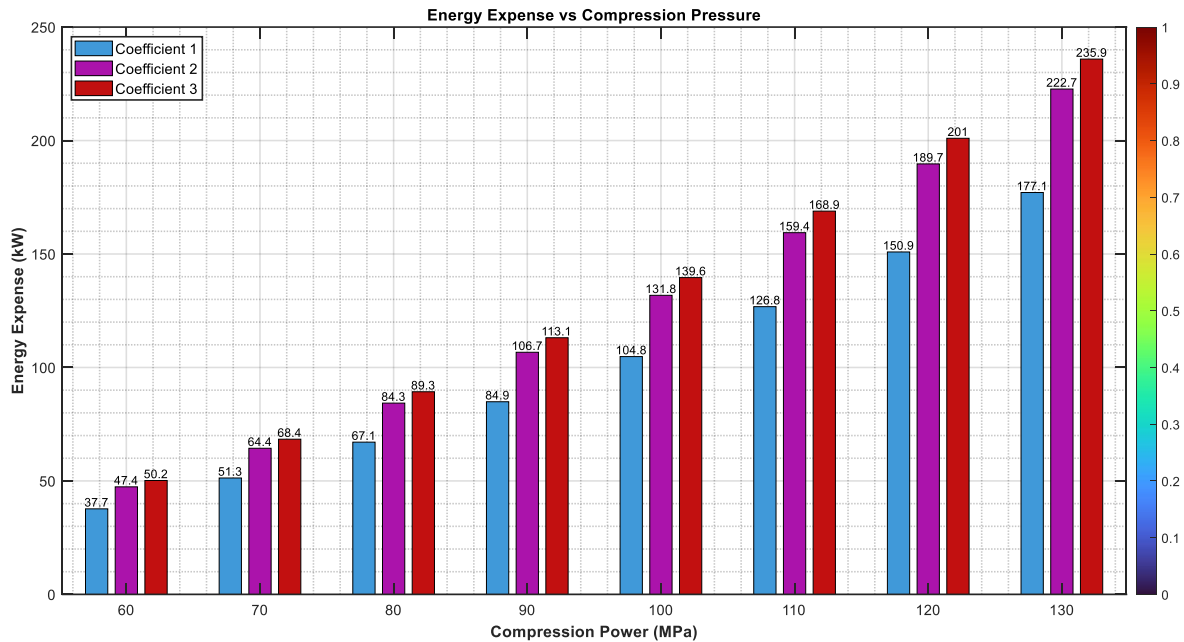


FIGURE 2. Special energy spend initial of the material compression to the power connection.

Compression power From 60 MPa to 130 MPa at $i=4.6$ when changing crusher electricity spent power quadratic function as 50 kW from 235 kW to increases , productivity and 384 t/h equal become remains and comparison energy consumption from 0.13 kW/h to 61 kW/h to increases. Table 3 and in the Fig 3 power, productivity, self typical energy consumption conical rotation to the speed dependence explained [7].

TABLE 3. Energy spend conical rotation to the speed connection

AC motor rotation speed, rpm	Electricity consumption to be done power, kW	Productivity Q, t/h	Special energy expense kW/t
700	128.3	172.3	0.745
800	146.7	197.0	0.745
900	165.0	221.6	0.745
1000	183.3	246.2	0.745
1100	201.7	270.8	0.745
1200	220.0	295.5	0.745

Based on the above table, it can be understood that as the cone rotation speed increases, the electrical energy consumption also increases. However, the productivity also increases proportionally. Therefore, choosing the optimal speed will lead to increased productivity.

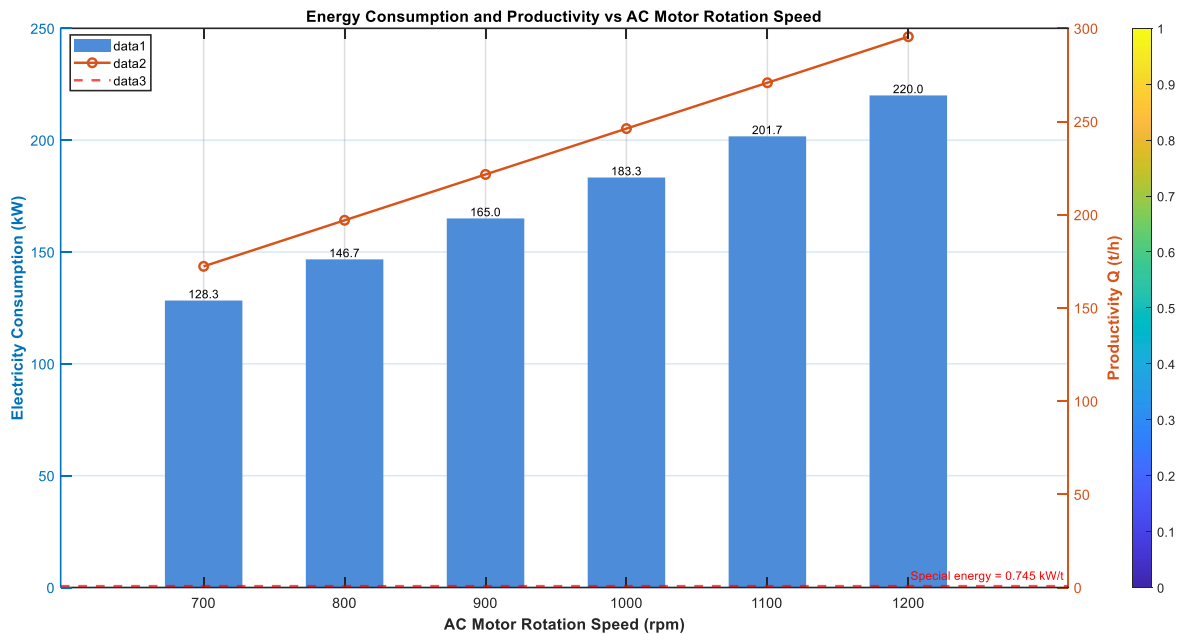


FIGURE 3. Marked energy spend conical rotation to the speed connection.

From figure 3, it turns out that the crusher rotation speed from 700 to 1200 rpm when increased, productivity from 172 t/h to 300 t/h increases, power and grinder fertility straight away proportional 128 kWt from 220 kWt until increases and comparison energy consumption 0.7 kWt to does not change [8].

CONCLUSIONS

The study allowed us to identify the parameters that affect certain energy consumption. Based on the above relationships, the following conclusions can be drawn:

1. As the grinding ratio increases, the power consumed by the electric drive motor increases unevenly, the efficiency of the crusher decreases, and the specific energy consumption index increases;
2. With an increase in the compression force limit and a constant grinding ratio, the power consumed by the electric motor of the crusher and the specific energy consumption increase, but the efficiency does not change;
3. With an increase in the rotation speed, the power consumed by the electric motor of the crusher and the productivity of the crusher increase in direct proportion. In this case, the specific energy consumption does not change;
4. The established dependences of specific consumption on the initial material parameters and the operating modes of the crusher allow assessing its energy efficiency and can be used to automate the crushing process.

REFERENCES

1. Olimov J., Ramazonov B., Sayfiyev S. Increasing efficiency of induction motor by predictive control system //E3S Web of Conferences. – EDP Sciences, 2024. – T. 525. – C. 03006. <https://doi.org/10.1051/e3sconf/202452503006>
2. Shirinov S.G., J.S. Olimov, I.Z. Jumayev, M.K. Sayidov Analysis of patterns of electricity consumption in mining and processing enterprises. Vibroeng. Procedia 2024, 54, 308–313. <https://doi.org/10.21595/vp.2024.24073>
3. N.Ataullayev, A.Norqulov, B.Muxammadov, A.Majidov, I.Tog'ayev. Principles of protection against single phase earth faults in networks with capacitive current compensation. E3S Web of Conferences, 548, 06008 (2024). <https://doi.org/10.1051/e3sconf/202454806008>

4. Jumayev, Z.I., Karshibayev, A.I., Sayidov, M.K., & Shirinov, S.G. Analysis of climate-meteorological and technological factors affecting electricity consumption of mining enterprises. *Vibroengineering Procedia*, Vol. 54, pp. 293-299 (Apr. 4 2024). <https://doi.org/10.21595/vp.2024.24047>
5. Amirov S.F., Ataulloyev N.O., Ataulloyev A.O., Muxammadov A.O., Majidov B.Q., A.U. Methods for reducing the temperature components of magnetomodulation DC converter errors. *E3S Web of Conferences*, **417**, 03011 (2023). <https://doi.org/10.1051/e3sconf/202341703011>
6. Amirov S.F., Ataulloyev A.O., Sayidov M.K., Togayev I.B. Methods of reduction of interference signals in electromagnetic conductors that measure fluid flow *Journal of Physics: Conference Series*, 2094(5), 052053 (2021) [10.1088/1742-6596/2094/5/052053](https://doi.org/10.1088/1742-6596/2094/5/052053)
7. Bobur Narzullayev; Javokhir Boboqulov, Improving reliability based on diagnostics of the technical condition of electric motor stator gutters, *AIP Conf. Proc.* **3331**, 030032 (2025). <https://doi.org/10.1063/5.0305735>
8. Olimov, J. S., Fayziyev, S. S., Raximov, F. M., Majidov, A. U., & Muxammadov, B. Q. (2023). Controlling power of short circuited induction motor via modern sensors without speed change. In *E3S Web of Conferences* (Vol. 417, p. 03007). EDP Sciences. <https://doi.org/10.1051/e3sconf/202341703007>
9. Turdibekov K. et al. Experimental and statistical methods for studying the modes of electric power systems under conditions of uncertainty // *E3S Web of Conferences*. – EDP Sciences, 2023. – T. 452. – C. 04002. <https://doi.org/10.1051/e3sconf/202345204002>
10. Rakhimov, F., Rakhimov, F., Samiev, S., & Abdukhalilov, D. (2024, June). Justification of technical and economic effectiveness of application of 20 kV voltage in overhead electric networks. In *AIP Conference Proceedings* (Vol. 3152, No. 1, p. 030023). AIP Publishing LLC. <https://doi.org/10.1063/5.0218921>
11. Tovbaev, A., Boynazarov, G., & Togaev, I. (2023). Improving the quality of electricity using the application of reactive power sources. In *E3S Web of Conferences* (Vol. 390, p. 06032). EDP Sciences. <https://doi.org/10.1051/e3sconf/202339006032>
12. Ataulloyev, N. O., Dziaruhina, A. A., & Murodov, K. S. (2023). Static Characteristics of Magnetic Modulation DC Converters with Analog Filter. *Science and technology*, 22(5), 428-432. <https://doi.org/10.21122/2227-1031-2023-22-5-428-432>
13. Qarshibaev, A. I., Narzullaev, B. S., & Murodov, H. S. (2020, November). Models and methods of optimization of electricity consumption control in industrial enterprises. In *Journal of Physics: Conference Series* (Vol. 1679, No. 2, p. 022074). IOP Publishing. DOI 10.1088/1742-6596/1679/2/022074
14. Tatkeyeva, G., Kurabayev, I., Ataulloyev, N., & Murodov, X. (2022, July). Experimental research of the developed method to determine the network insulation for ungrounded AC systems in laboratory conditions. In *2022 International Conference on Electrical, Computer and Energy Technologies (ICECET)* (pp. 1-4). IEEE. DOI: [10.1109/ICECET55527.2022.9873012](https://doi.org/10.1109/ICECET55527.2022.9873012)
15. Abdullaev, S., Eshmurodov, Z., & Togaev, I. (2025, November). A systematic analysis of the gradual increase in quality indicators of electricity using reactive power sources involves several steps. In *AIP Conference Proceedings* (Vol. 3331, No. 1, p. 040051). AIP Publishing LLC. <https://doi.org/10.1063/5.0306786>
16. Nazirova, H., Nazirova, O., Toshxo'jayeva, M., Badalova, D., & Ramazonov, B. (2025, November). Optimization of electricity loss forecasting using ANN. In *AIP Conference Proceedings* (Vol. 3331, No. 1, p. 060027). AIP Publishing LLC. <https://doi.org/10.1063/5.0305944>
17. Eshmurodov, Z., Bobojanov, M., & Abdullaev, S. (2025, November). Investigation of factors affecting the efficiency of mining transport systems. In *AIP Conference Proceedings* (Vol. 3331, No. 1, p. 040013). AIP Publishing LLC. <https://doi.org/10.1063/5.0306591>
18. Ataulloyev, N., Nizomova, D., & Norqulov, A. (2023). Monitoring and control of the protection system of electric drives with the method of pulse-width modulation. In *E3S Web of Conferences* (Vol. 417, p. 03009). EDP Sciences. <https://doi.org/10.1051/e3sconf/202341703009>
19. Ataulloyev, A. O., & Sayidov, M. K. (2023). Investigation of multi loop linear magnetic circuits of electromagnetic flow converters with ring channels. In *E3S Web of Conferences* (Vol. 417, p. 03006). EDP Sciences. <https://doi.org/10.1051/e3sconf/202341703006>
20. Khudayarov, M., & Sherzod, F. (2024, June). Methodology for evaluating the efficiency of electrical networks of power supply systems. In *AIP Conference Proceedings* (Vol. 3152, No. 1, p. 030002). AIP Publishing LLC. <https://doi.org/10.1063/5.0218810>
21. Eshmurodov, Z. O., & Arziyev, E. I. (2023). Choice of energy-saving electric drives in quasi-stationary transport systems. In *E3S Web of Conferences* (Vol. 417, p. 03010). EDP Sciences. <https://doi.org/10.1051/e3sconf/202341703010>

22. Eshmurodov, Z., & Holboiv, F. (2018). Modernization of Control Systems of Electric Drives of Mine Lifting Machines. In *E3S Web of Conferences* (Vol. 41, p. 03006). EDP Sciences. <https://doi.org/10.1051/e3sconf/20184103006>
23. Rakhmonov, I., Jalilova, D., Shayumova, Z., Karimova, N., Abidova, G., & Khalikova, K. (2025, November). Voltage regulation issues in spinning enterprises. In *AIP Conference Proceedings* (Vol. 3331, No. 1, p. 080009). AIP Publishing LLC. <https://doi.org/10.1063/5.0306210>
24. Jalilova, D., Kasimova, G., Shayumova, Z., & Abidova, G. (2025, November). Current status of ensuring power quality in spinning mills. In *AIP Conference Proceedings* (Vol. 3331, No. 1, p. 070021). AIP Publishing LLC. <https://doi.org/10.1063/5.0306211>
25. Mahmutkhonov S., Baizhonova L., Mustayev R., Tashmatova S. Dynamic analysis of voltage-ampere characteristics and harmonic distortions in electric arc furnaces. // *AIP Conference Proceedings*. 3331(1), 2025. pp. 070023, 1–5. <https://doi.org/10.1063/5.0305745>.
26. Bobojanov M., Mahmutkhonov S. Influence of the consumer to power quality at the point of connection // *E3S Web of Conferences* 384. 2023. PP, 01041, 1-5. <https://doi.org/10.1051/e3sconf/202338401041>.
27. Bobojanov M.K., Karimov R.Ch., Popkova O.S., Tuychiev F.N., Makhmutkhanov S.K. Analysis of the results of experimental studies of the arc furnace DSP-30. // *Power Engineering Research & Technology*. 27(2), 2025. pp. 126–137. <https://doi.org/10.30724/1998-9903-2025-27-2-126-137>
28. Reymov K.M., Makhmuthonov S.K., Turmanova G., Uzaqbaev Q. Optimization of electric networks modes under conditions of partial uncertainty of initial information // *E3S Web of Conferences* 289, 07023 (2021). -2021, pp: 1-4, <https://doi.org/10.1051/e3sconf/202128907023>.
29. R. K. Kurbaniyazov, A. M. Reimov, A.T. Dadakhodzhaev, Sh. S. Namazov, B. M. Beglov. Nitrogen-phosphoric fertilizers produced by introduction of Central Kyzylkum phosphate raw material into ammonium nitrate melt. *Russian Journal of Applied Chemistry. Russ J Appl Chem* (2007) 80(11): 1984-88. <https://doi.org/10.1134/S1070427207110456>
30. Namazov, Sh.S., Kurbaniyazov, R.K., Reimov, A.M., Beglov, B.M. Hardness of the granules of ammonium nitrate doped with the Central Kyzylkum Phosphorite. *Russian Journal of Applied Chemistry. Russ J Appl Chem* (2007) 81(6): 1103–1106. <http://dx.doi.org/10.1134/s1070427208060402>.
31. Kurbaniazov, R.K., Reimov, A.M., Namazov, Sh.S., Beglov, B.M. Nitrogen-phosphoric fertilizers obtained by interaction of the concentrated solutions of ammonium nitrate with the mineralized mass of the phosphorites of Central Kyzylkum. *Russian Journal of Applied Chemistry. Russ J Appl Chem* (2009) 82: 1123. <https://link.springer.com/journal/11167>
32. Alimov, U.K., Reimov, A.M., Namazov, Sh.S., Beglov, B.M. The insoluble part of phosphorus fertilizers, obtained by processing of phosphorites of central kyzylkum with partially ammoniated extraction phosphoric acid. *Russian Journal of Applied Chemistry. Russ J Appl Chem* (2010) 83(3): 545–552. <https://doi.org/10.1134/S107042721030328>
33. Reymov, A.M., Namazov, S.S., Beglov, B.M. Effect of phosphate additives on physical-chemical properties of ammonium nitrate. *Journal of Chemical Technology and Metallurgy* 2013 48(4), 391-395. <http://dl.uctm.edu/journal/>
34. Reymov Akhmed, Namazov Shafat. Nitrogen-phosphorous fertilizers on the base of concentrated ammonium nitrate solution and Central Kyzylkum phosphate raw material. *Polish Journal of Chemical Technology* 16(3), Sep 2014, 30-35. <https://doi.org/10.2478/pjct-2014-0046>
35. Alisher Eshimbetov, Shahobiddin Adizov, Inderpreet Kaur, Akhmed Reymov. Is it possible to differentiate between 2-phenylaminodihydro-1,3-thiazine from 2-phenyliminotetrahydro-1,3-thiazine by spectral methods? New glance to the old problem. *European Journal of Chemistry* 12 (1) (2021). <https://doi.org/10.5155/eurjchem.12.1.77-80.2068>
36. A.Ahmadjonov, U.Alimov, P.Tuychi, A.Seitnazarov, A.Reimov, Sh.Namazov, S.Sadullayev. Effect of temperature on the kinetics of the process of nitric acid decomposition of Arvaten serpentinite. *IOP Conf. Series: Earth and Environmental Science* 1142 (2023) 012034. <https://www.scopus.com/pages/publications/85151285667>
37. Xudoyberdiev J., Reymov A., Kurbaniyazov R., Namazov S., Badalova O., Seytnazarov A. Mineral Composition of Nodular Phosphorite of Karakalpakstan and its Processing into Simple Superphosphate. (2023) *E3S Web of Conferences*, 449, art. no. 06005. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85178595919&doi=10.1051%2fe3sconf%2f202344906005&partnerID=40>
38. Kosnazarov K., Ametov Y., Khabibullaev A., Reymov A., Turdimambetov I., Shaniyazov S., Berdimuratova A. Characteristics of dust-salt transfer from the dried bottom of the Aral Sea and the Aral region, as well as their lossout. *E3S Web of Conferences*. <https://www.scopus.com/pages/publications/85212840616>

39. Seyilkhanova A., Reymov Q., Eshmuratov A., Gulimbetov B., Medetov M., Reymov A., Berdimuratova A., Shaniyazov Sh. E3S Web of Conferences ISSN: 25550403 Volume: 575.
<https://www.scopus.com/pages/publications/85212825022>
40. Turdimambetov I., Murgaš F., Victor F., Oteuliev M., Madreimov A., Shamuratova G., Atabayev S., Reymov A. Geojournal of Tourism and Geosites. ISSN: 20650817, Volume: 57 Pages: 1941 – 1951.
<https://www.scopus.com/pages/publications/85213872579>
41. Temirov G., Alimov U., Seytnazarov A., Reymov A., Namazov S., Beglov B. Rheological Properties and Composition of Products of Phosphogypsum Conversion with Sodium Carbonate. Russian Journal of General Chemistry. ISSN: 10703632 Volume: 94 Issue: 7 Pages: 1837 – 1847.
<https://www.scopus.com/pages/publications/85202786813>
42. Reymov A., Turdimambetov I., Pirnazarov N., Shaniyazov Sh., Absametova D., Baymurzaev A., Orazbaev A., Usnatdinov A., Tajetdinov S. Exploring novel techniques for measuring and identifying minuscule dust particles in the atmosphere. E3S Web of Conferences ISSN: 25550403 Volume: 575.
<https://www.scopus.com/pages/publications/85212822728>
43. Chavliyyeva F., Turakulov B., Kucharov B., Erkeyev A., Reymov A., Karshiboev M., Mamajonov M. Study of obtaining potassium hydroxide by electrochemical method on the bases of flotation and hallurgic potassium chloride. New Materials, Compounds and Applications ISSN: 25217194 Volume: 8 Issue: 2 Pages: 244 – 253.
<https://www.scopus.com/pages/publications/85204364412>
44. Kuldasheva S., Aziza A., Kulmatov R., Karimova G., Dauletbayeva R., Nortoijiyeva G., Reymov A. Study and assessment of mineralogical, chemical and granulometric composition of volatile soil-sand aerosols from the dried-out part of the Aral Sea. E3S Web of Conferences ISSN: 25550403 Volume: 575.
<https://www.scopus.com/pages/publications/85212848932>
45. M. Medetov, D. Musaev, U. Shakarbaev, A. Yusupova, J. Tajibaeva, A. Reymov, A. Yusupova, D. Bazarbaeva, B. Gulimbetov. Insect fauna of the Republic of Uzbekistan: Rare true bugs (Hemiptera, Heteroptera). Regulatory Mechanisms in Biosystems ISSN: 25198521 Volume: 15 Issue: 4 Pages: 882 – 888.
<https://www.scopus.com/pages/publications/85218798691>
46. Kurbaniyazov R.K., Khudoyberdiev J.H., Reymov A.M., Namazov Sh.S., Radjapov R., Seytnazarov A.R. Characteristics of nodular phosphorites of karakalpakstan and their processing into granular simple superphosphate. ChemChemTech ISSN: 05792991 Volume: 68 Issue: 1 Pages: 109 – 119.
<https://www.scopus.com/pages/publications/85211354040?origin=resultslist>
47. M.ZH.Medetov, J.K.Abdullaeva, A.M. Reymov, A.M.Miratdinova, A.K.Seytmuratov, J.D.Tajibaeva, R.S.Kadirov, N.A.Utemuratov, S.K.Kimyonazarov, J. Kudratov, R.S.Urazova, X.X.Keldiyova, U.B.Uralov. Diversity of true bugs (Hemiptera: Heteroptera) of the Southern Aral Sea Region, Uzbekistan. Biodiversitas ISSN: 1412033X Volume: 26 Issue: 7 Pages: 3125 – 3135.
<https://www.scopus.com/pages/publications/105014219940?origin=resultslist>
48. Ulugbek Urinov, Nilufar Hamidova and Ilhom Mirzakulov . Chemical technology of oligomers production from homopolymer based on epichlorohydrin and morpholine. E3S Web of Conferences 497, 03030 (2024) ICECAE 2024. <https://doi.org/10.1051/e3sconf/202449703030>
49. Bakhtiyor, K., Gafurov, B., Mamatkulov, A., Shayimov, F., Tukhtaev, B. AIP Conference Proceedings, 3331(1), 080001. <https://doi.org/10.1063/5.0306044>
50. Khusanov, B., Keunimjaeva, A., Jalelova, M., Rustamov, S. AIP Conference ProceedingsOpen source preview, 2024, 3152(1), 030024. <https://doi.org/10.1063/5.0218924>
51. Khusanov, B., Arzuova, S., Radjapov, Z., Babaev, O. AIP Conference ProceedingsOpen source preview, 2024, 3152(1), 030028. <https://doi.org/10.1063/5.0219241>
52. Urishev, B., F. Artikbekova, D. Kuvvatov, F. Nosirov, and U. Kuvatov. 2022. “Trajectory of Sediment Deposition at the Bottom of Water Intake Structures of Pumping Stations.” IOP Conference Series: Materials Science and Engineering, 1030(1). <https://doi.org/10.1088/1757-899X/1030/1/012137>
53. Nosirov, Fakhridin, Abdurasul Juraev, Ibragim Khamdamov, and Nurmukhammed Kuvatov. 2023. “Economic Calculation of a Photoelectric Station for Degradation Processes.” AIP Conference Proceedings. <https://doi.org/10.1063/5.0130642>
54. Nosirov, Fakhridin, Oleg Glovatsky, Bekzod Khamdamov, and Armen Gazaryan. 2023. “Increasing the Stability of the Supply Hydraulic Structures.” AIP Conference Proceedings. <https://doi.org/10.1063/5.0218867>