**Investigation of the processes of mechanical activation of phosphate fines**

**Petropavlovsky Igor Aleksandrovich**

doctor of technical sciences, professor of technology of inorganic substances,

D. Mendeleev University of Chemical Technology of Russia,

125047, Russia, Moskow, Miusskaya square, 9

e-mail: ipetropavlovsky@gmail.com

**Pochitalkina Irina Alexandrovna**

candidate of technical sciences, docent of technology of inorganic substances,

D. Mendeleev University of Chemical Technology of Russia,

125047, Russia, Moskow, Miusskaya square, 9

e-mail: pochitalkina@list.ru

**Zhantasov Kurmanbek Tazhmahanbetovich**

doctor of technical sciences, professor,

head of department of chemical technology of inorganic substances,

M.Auezov South Kazakhstan State University, Shymkent, Kazakhstan,

160012, Kazakhstan, Shymkent, Tauke khan avenue, 5,

e-mail:k\_zhantasov@mail.ru

**Bishimbaev Valihan Kozykeevich**

doctor of technical sciences, professor of chemical technology of inorganic substances,

M.Auezov South Kazakhstan State University, Shymkent, Kazakhstan,

160012, Kazakhstan, Shymkent, Tauke khan avenue, 5,

**Bazhirova Kamshat Nurlybekovna**

doctoral M.Auezov South Kazakhstan State University, Shymkent, Kazakhstan,

160012, Kazakhstan, Shymkent, Tauke khan avenue, 5,

**Dormeshkin Oleg Borisovich**

doctor of technical sciences, professor,

head of department of technology of inorganic substances,

Belarusian State Technological University, Minsk, Belarus,

220006, Belarus, Minsk, Sverdlov str., 13a,

e-mail:dormeshkin@yandex.by

**Key words:** shallow phosphorite, mechanical activation, digestible form of phosphates.

**Abstract.** The process of mechanical activation (MA) phosphate fines - substandard in chemical and granulometric composition of minerals was investigated. In samples after MA found a significant increase in digestible form P2O5 was found. That is associated with the processes of deformation of crystals and decrease the activation energy of dissolution of phosphate mineral. The results of chemical analysis of the starting material and the product information on specific surface and disperse composition using modern analyzersare presented. The product is significantly superior to the efficiency of conventional agrochemical phosphate fertilizer and may be a component of complex fertilizer phosphorus.

**References**

1. Egorov I.I., Vekshin V.V., Batsuev A.A. Activated phosphates Irkutsk region - effective fertilizers. Irkutsk: AN SSSR, 1988, 151 p.   
2. Kochetkov S.P., Zorihina Z.A., Klevtsov M.G. Conversion of calcium phosphates vibroizmelcheniem wet mode / / Journal of Applied Chemistry. 1975, Vol. 2, pp. 252-257.   
3. М. Chaikina. Physico-chemical basis of mechanical activation of phosphate complex systems and its applications: Author. dis. ... Doctor. chem. Sciences. Novosibirsk, 1996, 37 p.

4. Lehr J.K. Proc. 17th  Amm. mect. Fert. // Jnd Aound Table. 1967.

5. Phosphor technology. / Ed. V.A. Ershova. L.: Chemistry, 1979, 336 p.   
6. Collection of specific indicators of waste production and consumption. M., 1999, 65p.   
7. Agrochemicals / Ed. B.A. Yagodina. M.: Agropromizdat, 1989, 639 p.   
8. Dorzhieva S.G. Patterns of change in physico-chemical properties of natural phosphates under mechanical activation with additives: Author. dis. ... Cand. chem. Sciences. Irkutsk, 2005, 22 p.   
9. M. Chaikina Mechanochemical processing of phosphate ores substandard / / Special methods of ore dressing mining and chemical raw materials. GIGSKH Proceedings, 1985, Vol. 68, pp. 121-136.

10. Paudert R., Heinicke G., Phothig R. Phosphordungemittel durch tribomechanishe Aktivirung von apatitschen Phosphaten // Chem. Technik. 1978, Bd. 30, no. 9, pp. 470-475.

11. Temuujin J., Mijidsuren А., Erdentuya Т. Characterisation of mechanically activated Aldarkhaan (Mongolia) phosphorite // Химия в интересах устойчивого развития. 1999, Вып. 7, С. 725-735.

12. Usmanov Kh., Chernyakova R., Dzhusipbekov U. Influence of modifying additives on the properties of dispersed phosphorites // Perspectives of Innovations, Economics & Business, Volume 6, Issue 3, 2010, pp. 135-137.

**Investigate of a structure of the modified vermiculites by physical and chemical methods**

**Shapkin Nikolai** Pavlovich, PhD (of chemistry). Professor of the department of inorganic chemistry. School of Natural Sciences of Far Eastern Federal University.

e-mail: [shapkin.np@dvfu.ru](mailto:shapkin.np@dvfu.ru)

**Razov Valeryi** Ivanovich, PhD (of physics). Associate professor of the department of theoretical and experimental physics. School of Natural Sciences of Far Eastern Federal University

e-mail : [razov.vi@dvfu.ru](mailto:razov.vi@dvfu.ru)

**Khalchenko Irina** Grigorevna. Associate professor of the department of inorganic chemistry. School of Natural Sciences of Far Eastern Federal University

e-mail: [khalchenko.ig@dvfu.ru](mailto:khalchenko.ig@dvfu.ru)

**Korochentsev Vladimir** Vladimirivich. PhD (of chemistry). Head of the department of General physics. School of Natural Sciences of Far Eastern Federal University

e-mail: [korochentsev.vv@dvfu.ru](mailto:korochentsev.vv@dvfu.ru)

**Key words**: vermiculite, positron annihilation spectroscopy, chitosan.

**Аbstract.** Vermiculites from Kovdorskiy (Karelia) and Koksharovskogo (Primorye), modified by acid, chitosan, were investigated by positron annihilation spectroscopy, density measurement, dye adsorption, the nitrogen adsorption BET and porosimetry. It was shown that the density of vermiculites after acid treatment varies compared to the density of the initial samples, depending on the concentration of acid. Internal volume of the micropores and the value of maximum adsorption of brilliant green change is directly proportional to the density of modified vermiculite. Kovdorskiy vermiculite under the action of hydrochloric acid is much more deeply destroyed compared with vermiculite of Koksharovskiy field in the similar conditions. At the same time, more extensive destruction of the layered structure of the Kovdorskiy vermiculite deposit yields of more efficient sorbents for sorption of sorbtion of basic nature.

**Reference**

1. Vladimirov V.C., Moizis S.E., Karpuhin I.A. Patent N 2197450. 27.01.2003.

2. Shapki, Jamskaya N.N., Katkova S.A. // Izvestiya Vuzov. Pishevaya tehnologiya. 2010. № 1. P. 110-112.

3. Muzzarelli, R.A.A. //Chitin. New York : Pergamon Press. 1977. P.305.

4. Mashkova S.A., Razov V.I., Tonkih I.V. // Izvestiya Vuzov. Chemistry and chemical technologies. 2005. V. 48. №6. С. 149-152.

5. Strelnikova O.Yu, Belchinskaya L.I., Khodosova N.A. // Belgorod State University Scientific Bulletin. Natural sciences. 2011. № 15 (110). V.16. P.103-108.

6. Shantarovich V. P. // Journal of Nuclear and Radiochemical Sciences. 2006. V. 7. №.1. Р. R37-R52.

7. Pivtsaev, A.A., Razov, V.I., Karasev, A.O // Journal of Applied Spectroscopy. 2013. V.80. № 5. Р.806-808.

8. Brandt W. Positron dynamics solids //Appl. Phys. 1977. V. 5. P. 1-23.n N.P.

**Modeling and optimization of the process sulfuric acid leaching of manganese ores**

**Zhukov Dmitriy**, scientific researcher D. Mendeleev University of Chemical Technology of Russia,

125047, Russia, Moskow, Miusskaya square, 9

Tel. +7(499) 250-29-53

e-mail: dzhukov35@yandex.ru

**Keywords:** manganese recovery from ores, sulfuric acid leaching, mathematical modelling

**Abstract.** The article presents results of the development of a new method for iron-manganese ore beneficiation. Sulfuric acid leaching is studied. It was reviewed the patterns of leaching of the ore and its behavior depending on the consumption of acid, temperature, and duration. It is shown that for high extraction of manganese from these ores require quite hard mode leaching. A computer model of the leaching process is developed and optimization opportunities were analyzed. Performed a series of experiments on the agitation extraction of manganese from ore Usinsk Deposit using the developed mathematical model of the process of leaching allowed to indicate the direction of optimization of the real process in relation to the recommended fraction of granules, time leaching and acid concentration.

**References**

1. Seregin A. N. Current state and new approaches to solving Russian manganese problem // Problems of Iron Metallurgy and Material Science. 2011. # 4. P. 71 – 75.
2. The State Report “On the State and Usage of Mineral Raw Materials in the Russian Federation in 2009. The Ministry of Natural Resources and Environment of the Russian Federation, 2010.
3. The State Report “On the State and Usage of Mineral Raw Materials in the Russian Federation in 2010. The Ministry of Natural Resources and Environment of the Russian Federation, 2011.
4. Borzykh O. S. The geological and economic reconsideration of manganese ores in the South Siberia with the purpose of the development of iron alloys production. Abstract of PhD Dissertation (Geology and Mineralogy). 2012.
5. Mineral Deposits: Resources of Manganese. All-Russia Institute of Mineral Resources, 2012. URL: <http://vims-geo.ru/polezny-e-iskopaemy-e/sektor-cherny-h-metallov-i-alyuminievogo-sy-r-ya/marganets/>.
6. Manganese Market Outlook. CPM Group. New York, USA. 2012.
7. Manganese: Market Review of Ores and Alloys. The Eurasian Natural Resources Corporation. 2008.
8. Grigorieva O. Perspectives of completing new projects on the production of Markets of Metallurgical Raw Materials”. Alushta, 2010. P. 45 – 47.
9. The State and Usage of Mineral Raw Materials in the Russian Federation in 2009. Manganese. URL: <http://www.mineral.ru/Facts/russia/147/408/07_mn.pdf>.
10. Kuznetsova G. A. The Qualitative Roentgen Phase Analysis. Irkutsk, 2004. – 26 p.
11. Salikhganova R. M.-F., Ginzburg G. I. arographic analyzer and Their Use for the Practical Analysis and Research. Moscow; Chemistry, 1988. – 160 p.

Mehrer H. Diffusion in Solids. Moscow: Intellect, 2011. – 536 p.

**Mathematical modeling of a chemical reactor with different structures on the initial flow component and the reaction product**

**Golovanchikov Aleksandr** Borisovich, professor of the Volgograd state technical university, e-mail: [pahp@vstu.ru](mailto:pahp@vstu.ru)

**Dulkina Nataliya** Aleksandrovna, Phd, Volgograd state technical university,

Phone number (8442) 24-84-31

**Aristova Yuliya** Valerievna, senior teacher of the Volgograd state technical university, e-mail: [Arisjulia@yandex.ru](mailto:Arisjulia@yandex.ru)

**Keywords:** structure of the flow, diffusion model, the Peclet number, stirred reactor, tubular reactor.

**Abstract.** The mathematical description of diffusive one-parametrical model on the example of simple chemical reaction is received. It basis on the experimental data and modern modeling methods, the engineering analysis. The analysis of the received mathematical model of the chemical reactor for simple elementary reaction is carried out at Peclet's various numbers of an initial component and a reaction product. New boundary conditions for diffusive model of structure of streams are removed. Comparison of the received results calculated on offered model, with results one-parametrical diffusive модельи, including with extreme cases of values of numbers of Peclet corresponding to ideal replacement and mixture is carried out. When distinction in molecular diffusion of components of reaction big it is necessary to solve system of the non-uniform differential equations of the second order with Peclet's various numbers on each component.

**References**

1. Patent 2463585 RF, IPC G 01 N 27/06. A method for determining the structure of the fluid flow in the device / Golovanchikov A.B., Dulkina N.A., Aristova Yu.V., Vasilyeva E.V., Pavlov A.V.; VSTU. - 2012.

2. Zakheim, A.Y. Introduction to the modeling of chemical processes, 2nd ed., Rev. and add. - M.: Chemistry, 1982, 288 p.

3. Golovanchikov, A.B. Mathematical modeling of a chemical reactor with different diffusion structures for the reactants flow / Golovanchikov A.B., Dulkina N.A., ​​Aristova Yu.V. // Chemical industry today. - 2013. - № 3. - C. 51-55.

4. Mathematical modeling of chemical reactor with the diffusion flow structure for the reaction of n-th order / Golovanchikov A.B., Dulkina N.A., Aristova Yu.V., Dikareva N.N. // Proceedings VSTU. Series "Actual problems of management, computer science and informatics in technical systems." Issue 18: Interuniversity compilation of scientific articles / VSTU. - Volgograd, 2013. - № 22 (125). - C. 25-29.

5. Golovanchikov, A.B. Simulation of flow patterns by two indicators / Golovanchikov A.B., Dulkina N.A., Aristova Yu.V. ​​// Encyclopedia of Chemical Engineering. - 2013. - № 9 . - C. 33-36.

6. Golovanchikov, A.B. Modeling of chemical reactors with different structures and levels streams segregation implementing components / Golovanchikov A.B. Dulkina N.A., ​​Aristova Yu.V. // Math. VSTU. Series "Actual problems of management, computer science and informatics in technical systems." Issue 12: Interuniversity compilation of scientific articles / VSTU. - Volgograd, 2011. - № 11. - C. 12-15.

7. Diffusion model structure for polytropic flow tubular reactors / Golovanchikov A.B., Dulkina N.A., Aristov Yu.V., Fotina N.I. // Proceedings VSTU. Series "Rheology , processes and devices of chemical technology" Issue 6: Interuniversity compilation of scientific articles / VSTU. - Volgograd, 2013. - № 1 (104). - C. 54-58.

8. Golovanchikov, A.B. Calculation of chemical reactor with the diffusion model for the structure of flows and different Peclet numbers for the reactants / Golovanchikov A.B., Dulkina N.A., ​​Aristova Yu.V. // Proceedings of the universities. Chemistry and chemical technology. - 2012. - T. 55 , № 8 . - C. 111-114.

**The use of ceramic high-porous block-cellular contact devices in the process of hydrogen isotopes phase exchange**

**Gasparyan Mikhael** D., PhD, scientific researcher D. Mendeleev University of Chemical Technology of Russia,

125047, Russia, Moskow, Miusskaya square, 9

e-mail: migas56@yandex.ru

**Grunsky Vladimir** N., doctor of technical sciences, chief of the chair D. Mendeleev University of Chemical Technology of Russia,

125047, Russia, Moskow, Miusskaya square, 9

e-mail: oxt2011@mail.ru

**Bespalov Aleksander** V., doctor of technical sciences, professor D. Mendeleev University of Chemical Technology of Russia,

125047, Russia, Moskow, Miusskaya square, 9

Tel. +7(499) 978-90-63

**Popova Nellya** A., assistant D. Mendeleev University of Chemical Technology of Russia,

125047, Russia, Moskow, Miusskaya square, 9

Tel. +7(495) 39-66

**Rozenkevich Mikhail** B., doctor of technical sciences, chief of the chair, professor D. Mendeleev University of Chemical Technology of Russia,

125047, Russia, Moskow, Miusskaya square, 9

e-mail: rozenkev@rctu.ru

**Pak Yuriy** S., PhD, leading scientific researcher D. Mendeleev University of Chemical Technology of Russia,

125047, Russia, Moskow, Miusskaya square, 9

e-mail: samdor@rctu.ru

**Bukin Aleksey** N., post graduate student D. Mendeleyev University of Chemical Technology of Russia,

Tel. +7(495)490-84-84

e-mail: [nar-roman@rambler.ru](mailto:nar-roman@rambler.ru)

**Marunich Sergey** A. scientific researcher D. Mendeleev University of Chemical Technology of Russia,

125047, Russia, Moskow, Miusskaya square, 9

Tel. +7(495) 490-84-84

**Putin Sergey** B., doctor of economic science, deputy director Open joint stock company "Corporation Roshimzaschita"

Tel. +7(4752)56-06-80

**Gladyshev Nikolay** F., PhD, Deputy Head of Division Open joint stock company "Corporation Roshimzaschita"

Tel. +7(4752) 53-01-11

**Zaytceva Lada A.**,scientific researcher Open joint stock company "Corporation Roshimzaschita"

Tel. +7(4752)53-01-11

**Keywords**: ceramic high-porous cellular materials (HPCM), contact mass-transfer devices, phase isotopic exchange, vapors of tritiumed water, detritiation, theoretical stage of separation

**Abstract.** The article presents the installation and process description of phase isotope exchange between tritiumed water vapors and liquid natural water, alternative to the process of adsorption drying in the scheme of air detritiation into hermetic space. As a nozzle for mass-exchange columns proposed a highly porous ceramic block-cellular contact devices. Slurry technology of their synthesis by method of duplication structure of polymer matrices and methods of application on the obtained ceramic frame hydrophilic zeolite layer was demonstrated. The results of research of ceramic mass-transfer contact devices efficiency in the process of hydrogen isotopes phase exchange in comparison with imported nozzle CY-type from company Sulzer Chemtech (Switzerland) are presented.

**References**

1. Patent RU № 2474558. Sposob polucheniya keramicheskikh blochno-yacheistykh filtrov-sorbentov dlya ulavlivaniya gazoobraznykh radioaktivnykh i vrednykh veschestv / Gasparyan M/D., Kozlov I.A., Grunsky V.N., Bespalov A.V., Glagovsky E.M. Byull.28, 2013.

2. Gasparyan M.D., Grunsky V.N., Magomedbekov E.P., Bespalov A.V., Ignatov A.V., Lebedev S.M. Lokalization of radioaktive methil iodide on ceramic sorbents. Ogneupory i tekhnicheskaya keramika [Refractories and technical ceramics], 2011, no.11-12, pp. 24-26 (in Russ.).

3. Gasparyan M.D., Grunsky V.N., Bespalov A.V., Magomedbekov E.P., Popova N.A., Baranov S.V., Batorshin G.Sh., Bugrov K.V., Zanora Yu.A., Istomin I.A., Stepanov S.V., Makarov O.N. Prospects of application ceramic high-porous block-cellular filter-sorbents of gaseous radioactive cesium in solving the issues of ensuring ecological safety production of nuclear branch. Ekologiya promyshlennogo proizvodstva [Ecology of industrial production], 2014, no. 1, pp. 26-33 (in Russ.).

4. Gasparyan M.D., Grunsky V.N., Bespalov A.V., Popova N.A., Rozenkevich M.B., Pak Yu.S., Sumchenko A.S., Bukin A.N. Ceramic high-porous block-cellular catalysts for hydrogen isotopes oxidation with applied platinum active layer. Ogneupory i tekhnicheskaya keramika [Refractories and technical ceramics], 2014, no.7-8, pp. 49-54 (in Russ.).

5. Andreev B.M., Magomedbekov E.P., Rozenkevich M.B., Sakharovsky Yu.A. Heterogeneous reactions of isotopic exchange of tritium. М., URSS, 1999, 208 p.

6. Rozenkevich M.B., Magomedbekov E.P. Solutions to problems gaseous discharges of tritium. Bezopasnost okruzhayuschey sredy [Environment safety], no.1, 2009, pp. 90-93.

7. Andreev B.M., Zelvensky Ya.D., Katalnikov S.G. The heavy isotopes of hydrogen in nuclear enginiring. 2000, М., IzdAT, 344 p. The heavy isotopes of hydrogen in nuclear engineering.

8. Grunsky V.N. Small volume catalytic system cellular structure with advanced adjustable outer surface. Doctoral dissertation. М.: Rossiskiy Khimico-Tekhnologycheskiy Universitet im. D.I. Mendeleyeva [Russian Mendeleev University of Chemical Technology], 2009, 329 p.

9. Grunsky V.N., Kozlov I.A., Bespalov A.V., Gasparyan M.D., Lukin E.S., Starodubtseva O.V. The thermal treatment of the unitized high porous cellular ceramic materials. Ogneupory i tekhnicheskaya keramika [Refractories and technical ceramics], 2011, no.6, pp. 18-21 (in Russ.).

10. Grunsky V.N., Bespalov A.V., Gasparyan M.D., Ignatov A.V., Starodubtseva O.V., Lukin E.S. The frame and structural characteristics of the high porous penetrable cellular ceramic materials with using of the slip on the base of the aluminosilicats blinders. Ogneupory i tekhnicheskaya keramika [Refractories and technical ceramics], 2012, no.4-5, pp. 8-12 (in Russ.).

11. Grunsky V.N., Bespalov A.V., Gasparyan M.D., Starodubtseva O.V., Lukin E.S. The high porous penetrable cellular ceramic materials with using of the slip on the base of the aluminosilicats blinders. Ogneupory i tekhnicheskaya keramika [Refractories and technical ceramics], 2012, no.4-5, pp. 45-48 (in Russ.).

12. Van Hook A. Vapor Pressures of the Isotopic Waters and Ices // J. Phys. Chem., 1968, V. 72, No. 4, p. 1234-1244.

**Granular materials and air methods of cleaning in pneumatic transport installations**

**Vasilevsky Mikhail** V., docent, National Research Tomsk Polytechnic University, Tomsk Polytechnic University, TPU

e-mail: [vasmix40@mail.ru](mailto:vasmix40@mail.ru)

**Izvekov Vladimir** N., docent, National Research Tomsk Polytechnic University, Tomsk Polytechnic University, TPU

e-mail: [izvekovvn@tpu.ru](mailto:izvekovvn@tpu.ru)

**Romandin Vladimir** I., leading scientific researcher, Research Institute of Applied Mathematics and Mechanics of Tomsk State University

e-mail: [romandin@niipmm.tsu.ru](mailto:romandin@niipmm.tsu.ru)

**Keywords**: pneumatic, granular material, impurity, winnowing, air purification.   
**Abstract**. Pneumatic transport apparatus for granulated materials are the basic element of the techgnique of polymeric material confection. When the polyethylene granulated particles are pneumatically transported under the high pressure, the particles interact with the reflected surfaces, as a result, the upper layer of the surface is generated and destructed. This processes lead to the creation of the impurities in the form of the dust, and fibers. The impurity enters to the reservuor, is separated into the walls due to the electric forces. Then the impurities are accumulated on the walls and the porous fibers are generated, which penetrates into the material. It leads to the decreasing of the final product quality and the air contamination. In this paper the stability of the purification systems for granulated materials and the air in the pneumatic transport apparatus are analyzed. The advantages of the centrifugal techniques the dust deleting compared with the gravitational techniques are shown. The characteristics of the apparatus are presented.

**References**

1. *Poli e`tilen vysokogo davleniya: nauchno−tekhicheskie osnovy promyshlennogo sinteza* (Polythene of a High Pressure: Scientific and Technical Basis for the Industrial Synthesis) */* A.V. Polyakov, F.I. Duntov, A.E`., Sofiev N.YA. Tumarkin, YU. N. Kondrat`ev, N.M. Domareva, A.L. Gol`denberg, V.M. Kobyakov, V.S. Zernov. // *L.: Khimiya: Leningr. otd-nie* (Leningrad: Chemistry), 1988.
2. Korol`chenko A. YA. *Pozharovzryvobezopasnost` promyshlennoj pyli* (Fire Safety of Industrial Dust). // *M.: Khimiya* (Moscow: Chemistry),1986.
3. *Rukovodyashhie tekhnicheskie materially. Pnevmotransport sypuchikh materialov (granulirovannykh i poroshkoobraznykh) vzves`yu, s porshnevoj strukturoj i sploshnym potokom materiala* (Technical Guidance Materials. Pneumatic Conveying of Friable Materials (granular and powdered) Suspension, with the Piston Structure and a Continuous Flow of Material )/ *pod redakсziej* Egorova V.M. i Svishheva B. G. //*MKHP SSSR.* *Tomsk: izd-vo Tomsk. un-ta* (Ministry of Chemical Industry of the USSR. Tomsk: Tomsk State University)*.* 1987.
4. Nogin E.I., Nemzhov L.L. *Issledovanie vliyaniya razlichnykh faktorov na pyleobrazovanie pri pnevmotransporte polie`tilena.*( Investigation of the Influence of Various Factors on the Formation of Dust During Pneumatic Transport of Polyethylene) *// obespylivanie vozdukha i mikroklimat* (Dedusting Air and Climate)*. Mezhvuzovskij sbornik. Rostov-na-Donu, RISI* (Interuniversity collection. Rostov-na-donu, Rostov Civil Engineering Institute)*,* 1980, pp. 41−43.
5. Nogin E.I. *O skorostyakh vitaniya produktov iznosa granulirovannogo* *polie`tilena.*( Speeds of Fall Offspring Wear of Granulated Polyethylene)// *Tekhnika, tekhnologiya, organizaсziya i e`konomika stroitel`stva. Respublikanskij mezhvedomstvennyj sbornik, issue 11*(Engineering, technology, business and economics of construction. National Interagency collection, Issue 11)*. Minsk, Vyshejshaya shkola* (Minsk, Higher School)*,* pp. 45−47.
6. Malis A. YA., Demidov A.R. *Mashiny dlya ochistki zerna vozdushnym potokom.*( Machines for Cleaning Grain by Air Flow.) *// M.: Mashinostroenie* (Moskow: Mechanical Engineering), 1962.
7. Barskij M.D., Revnivzhev V.I., Sokolkin YU.V*. Gravitaсzionnaya klassifikaсziya zernistogo materiala.*( Gravitational Classification of Granular Material) *// M.: Nedra* (Moscow, Nedra)*,* 1974.
8. Vasilevsky M.V., Romandin V.I., Zykov E.G. *Transportirovka i osazhdenie chasticz v tekhnologiyakh pererabotki dispersnykh materialov.*( Transport and Deposition of Particles in the Particulate Materials Processing Technology) *// Tomsk: izdatel`stvo Tomsk.politekhn. univ-ta* (Tomsk: Tomsk. Polytechnic. Univ.), 2013.
9. *Avtorskoe svidetel`stvo SSSR* (USSR Inventor's Certificate) № 1256816. *Ustrojstvo dlya ochistki zernovykh i granulirovannykh materialov ot primesej.*( Device for Cleaning Cereal and Granular materials from impurities) Vasilevsky M.V., Anisimov ZH. A., Svishhev B.G., Kochetkov N.A., Roslyak A.T., Gordeev V.K., *Byull.* № 34, 1986.
10. Vasilevsky M.V., Romandin V.I., Zykov E.G., Polyushko V.A., Razva A.S.

*KHarakteristika potoka s dispersnoj fazoj v vikhrevoj kamere* (Characteristics of a Flow with the Dispersed Fhase in the Vortex Chamber) *// Vestnik Tomskogo gosudarstvennogo universiteta. Matematika i mekhanika* (Tomsk State University Journal of Mathematics and Mechanics)/ 2013. №3(23), pp. 66−75.

1. Vasilevsky M.V., Anisimov ZH. A., Svishhev B.G. *Rezul`taty issledovaniya opytno−promyshlennogo separatora ochistki poli e`tilena vysokogo davleniya.* (The Results of Experimental Studies of Industrial Cleaning Separator Granular Density Polyethylene) *// Voprosy prikladnoj ae`romekhaniki i teplomassoobmena. Tomsk: Izd−vo Tomsk. un-ta* (Questions applied mechanics and heat and mass transfer, Tomsk: Tomsk State University)*,* 1989, pp.84−90
2. *Avtorskoe svidetel`stvo SSSR* (USSR Inventor's Certificate)№ 1554985. *Sposob separaczii iz vozdushnogo potoka nae`lektrizovannoj polimernoj primesi* (A Method of Separation Air Flow from Electrical Polymer Impurities). Vasilevsky M.V., Anisimov ZH. A., Svishhev B.G., Kochetkov N.A., Gordeev V.K., *Byull.* № 13, 1990.

**The investigation of equilibrium adsorption and adsorption kinetics neonol AF 9-10 on activated carbons from water**

**Pavel V. Uchanov**, post graduate student D. Mendeleev University of Chemical Technology of Russia, e-mail: [p.uchanov@gmail.ru](mailto:p.uchanov@gmail.ru)

**Irina N. Kamenchuk**, Leading Researcher of Department of Industrial Ecology D. Mendeleev University of Chemical Technology of Russia, tel. +7(495) 495-21-71

**Nurgul Zholdasbekova**, graduate student D. Mendeleev University of Chemical Technology of Russia, e-mail: [nurgull\_01@mail.ru](mailto:nurgull_01@mail.ru)

**Viktor M. Mukhin**, , doctor of technical scicence, professor, Head of Laboratory of Activated Carbons JSC Electrostal Scientific Production Association “Neorganika”, e-mail: [neorg.el@mail.ru](mailto:neorg.el@mail.ru)

**Keywords:** activated carbon, adsorption isotherm, micropore volume, surfactants, solutions, static of adsorption, kinetic curves, activated carbon dosage, water treatment

**Abstract.** The adsorption isotherms of neonol AF 9-10 on activated carbons brands DAS Gidrosorb-ERM and F-300 were measured. The kinetic adsorption curves were determined, which are calculated on the basis of the effective diffusion coefficient. The priority development of a microporous structure in coal of DAS was shown. There were identified doses of activated carbons to reduce the concentration of surfactant neonol AF 9-10 in water. The advantages of activated carbon DAS in statics and kinetics of processes of adsorption organic pollutants from water were shown. Concluded that the effectiveness of activated anthracite in the water treatment process to the MPC.

**References**

1. A.I. Rodionov, V.N. Klushin, V.G. Sister. Technologicheskie processi ecologicheskoi bezopasnosti. N. Bochkareva Publisher. Kaluga. 2000. p. 799

2. V.M. Mukhin, A.V. Tarasov, V.N. Klushin, Aktivnie ugli rossii. Metallurgy Publishing House. Moscow. 2000. p. 352

3. V.M. Mukhin, V.N. Klushin. Proizvodstvo i primenenie uglerodnih adsorbentov. MUCTR Publishing House. Moscow. 2012. p. 317

4. H. Kinkli, E. Bader. Aktivnie ugli i ih promislennoe primenenie. ‘Khimia’ Publishing House. Leningrad. 1984. p. 215

5. A.O. Smirnov. Sorbcionnaya ochistka vodi. ‘Khimia’ Publishing House. Leningrad. 1982. p. 168

6. Novie metodi podgotovki pitevoi vodi na rublevskoi vodoprovodnoi stancii. V.V. Polyakov, A.V. Koverin, O.E. Blagova. Vodosnabzhenie i sanitarnaya technika. № 5 (part 2) 2003. p. 9-14

7. Razrabotka technologii aktivnih uglei na osnove antracita s visokoi obemnoi adsorbcionnoi sposobnostu. V.M. Mukhin, N.I. Sotnikova, P.V. Uchanov

8. Sontheimer, Crittenden, Summers. Activated Carbon for Water Treatment. Second Edition in English. DVGW-Forschungsstelle Engler-Bunte-Institut Universitat Karlshruhe. 1988. c. 722

9. Tekhnicheskie uslovia 38.103625-87 ‘Poverhnostno aktivnoe veshestvo neonol 9-10’

10. N.V. Kelcev ‘Osnovi adsorbcionnoi tekhniki. ‘Khimia’ Publishig House. Moscow. 1976. p. 511