ABSTRACT AND REFERENCES

ECOLOGY

INFLUENCE OF EXTRACTION CHAMBERS BACKFILLING ON MICROCLIMAT OF DEEP MINES (p. 3-11)

Alexandr Lapshin

To enhance the safety of underground works and save the earth surface from caving, mining enterprises perform underground ore extraction using backfilling. Together with a positive solution to the problem of mining safety and environmental improvement when using the backfilling system, there is a problem of heat emission during backfilling material hydration. To solve this problem, the studies of thermophysical properties of rocks of Kryvbas and Zaporozhye iron-ore plant, as well as backfilling materials, used to fill the worked-out space, are conducted.

As a result of laboratory studies, the values of heat conductivity λ, W/m·K, heat capacity C, kJ/kgK and thermal diffusivity α, m^2/s of rocks and backfilling materials are determined. Determining thermophysical properties of rocks and backfilling materials has allowed to define the boundaries of influence of backfill hydration heat in chambers on the surrounding rock mass.

The way to reduce the temperature in exhaust chambers during hydration of solid backfill by adding crushed rocks from the developed deposit in the backfilling mixture is considered. Thus, by calculations and observations, it is found that using crushed rocks as the backfilling mixture component allows to reduce the zone of influence of backfill hydration on the temperature mode of adjacent mine workings up to 10 m.

Keywords: microclimate, normalization, airing, backfilling, hydration, thermophysical parameters, temperature, humidity.

References

1. Stupnik, M. I., Pysmennyi, S. V. (2012). Combined methods of further development of Krivbass iron ore deposits. Journal of Krivoy Rog National University, 3–7.
2. Smorchkov, Y. P., Petrunin, G. O. (2008). Assuring of comfortable working conditions in irredundant mine workings at drilling and blasting method excavation. Labour Safety in Industry, 17–21.
3. Alekseenko, S. A., Sheihlislamova, I. A. (2005). Alternative energy-saving method and underground condition system of mine air conditioning for deep coal mines. Refrigerating engineering and technology, 15–17.
4. Kazakov, B. P., Shalimov, A. V., Zaycev, A. V. (2012). Influence of backfilling works on the formation of thermal regime in mine workings of ore mines. Bulletin of Perm National Research Polytechnic University, 110–114.
5. Lapshin, A. A., Lapshin, A. E., Oshmyanskyi, I. B. (2008). The problem of the thermal regime of the deep iron ore mines and the establishment of effective ways of its normalizing. Dnepropetrovsk: National Mining University, 98–105.
6. Kuzin, V. A., Alabiev, V. R., Pesok, S. A., Rosenberg, A. S. (1995). Selection Guide of mining methods for normalization of climatic conditions on working areas of deep mines. Donetsk, 44.
7. Lapshin, A. A., Lapshin, A. E., Oshmyanskyi, I. B. (2011). Designing guidance of ventilation in ore mines;. Krivoi Rog: Krivoi Rog Technical University, 98–105.
8. Kortnik, J. (2003). Backfilling waste material composites environmental impact assessment. South African Institute of Mining and Metallurgy, 519–524.
9. Krupnik, L. A., Shaposhnik, Y. N., Shaposhnik, S. N., Tursunbaeva, A. K. (2013). Backfilling technology in Kazakhstan mines. Journal of Mining Science, 82–89.
10. Ward, C. R, French, D., Jankowski, J. (2007). The use of coal combustion products in mine backfill applications. Co-operative Research Centre for Coal in Sustainable Development, 341–371.
11. Lyashenko, V. I., Dyadechkin, N. I. (2011). Improving of backfill technology operations in underground mining of uranium deposits. News of Universities. Mining Journal, 9–17.
12. Ghoreishi-Madiseh, S. A., Hassani, F., Abbasy, F., Mohammadian, A. (2011). Numerical modeling of thawing in frozen rocks of underground mines caused by backfilling. International journal of rock mechanics and mining sciences, 1068–1076.
13. Galkin, A. F. (2008). Regulation of thermal regime at mining excavation in frozen rocks. Labour Safety in Industry, 17–21.
14. Andreev, M. N., Boguslavskiy, E. I. (2011). Development of stowing material and test its strength properties. Notes of Mining Institute, 130–133.
15. Zhang, H. B., Chen, Y. J. (2013). Study of the mechanism of backfill and surrounding rock of open stope during subsequent backfill mining. Advanced material research, 452–456.

MATHEMATICAL MODELING OF CLEANING DUST-LADEN GAS FLOWS IN THE CYCLONE DUST COLLECTOR (p. 11-16)

Dmitriy Serebryanskyy, Sergey Plashyhin, Yuriy Beznosyk, Alexander Nabok

The issues of developing a mathematical model for calculating the aerodynamic drag and collection efficiency of solid particles in the cyclone collector, which takes into account the geometry and the opening angle of the louver element of designed dust collector, are considered in the paper.

Experimental studies of the cyclone collector are given and the adequacy of the developed mathematical model is verified. Experimental data processing has allowed to determine the dimensionless coefficients n, m, l, included in the equation for determining fractional dust collection efficiency in the developed dust collector.

Theoretical calculation of aerodynamic drag is conducted and the technique, suitable for the cyclone collector is determined by comparing with experimental results. The discrepancy between the experimental and theoretical data is 13.9 %.

Dust collection efficiency is theoretically calculated using the mathematical model. The discrepancy between the experimental and theoretical data is 1.06 %. Experimental data processing is conducted and criterion equation for calculating partial coefficients of cleaning is found.

Keywords: mathematical model, aerodynamic drag, dust collection efficiency, criterion equation.

References

1. Patskov, V. P., Topal, A. I., Kritskii, A. V. (2007). Existing methods for evaluating the effectiveness of the cyclone apparatus. Industrial Heat, 29 (7), 194-200.
2. Shilyaev, M. I., Shilyaev, A. M. (2003). Energy comparison principle and universal method for calculating the inertial precipitators. Indoor air quality and the environment. Mat. II international, scientific. conf. Volgograd: Univ Volga. Reg. arhit.-builds. University Press, 98-105.
3. Birger, M. I., Valdberg, A. Yu., Miyagkov, B. I. (1983). Reference dust and ash collection. Under Society. Ed. A.A. Rusanov. 2nd ed., Ln. and additional. Moscow: Energoatomizdat, 312.
4. Priemov, S. I. (1996). Calculation method cyclone dust collectors. Industrial Heat, 18 (4), 49 - 52.
5. Muschelknautz, E. (1991). Druckverlust and Absheidengrad in Cyclon. VDI: Warmenatlas. 6, 1–8.
6. Teverovsky, E. N., Dmitriev, E. S. (1988). Transfer aerosol particles turbulent flows. Moscow: Energoatomizdat, 160.
7. Shilyaev, M. I., Shilyaev, A. M., Gormolysova, I. V., Olenev, I. B. (2006). By fractional method of calculation of inertial precipitators. Proceedings of the universities. Building. 1, 62-67.
8. Santana, J. D. A. M., Armosti, S., Coury, J. R. et al. (1972). Performance of Cylindrical-conical cyclone with different geometrical configurations. Braz. Journ of Chem. Eng. 18 (3), 1–14.
9. Leith, D., Licht, W. (1972). The Collection efficiency on cyclone type particles collectors – a new theoretical approach. AIChe Journal, 68 (126), 196 – 206.

10. Plashykhin, S. V., Serebrianskiy, D. A., Beznosyk, Yu. A. (2010). Experimental studies cyclone filter in the process trapping cement dust. Bulletin of NTU "KPI": New solutions in modern tehnologiyah. Kharkov: 57, 3-6.
11. Serebrianskiy, D. A., Plashykhin, S. V. (2011). Testing centrifugal filter and cyclone filter at capturing of ash solid fuel boilers. Science news NTU "KPI", 5(79), 89–94.
12. Serebrianskiy, D. A., Plashykhin, S. V. (2011). Comparative tests centrifugal filter and cyclone filter. XIX International Scientific and Practical Conference. Innovative solutions to urgent problems of basic industries, environment, energy and resource, 3, 109–112.

ALUMINIUM COAGULANTS EFFICIENCY EVALUATION FOR NATURAL WATER CLARIFICATION (p. 17-20)

Vyacheslav Radovenchyk, Sofia Glynyana, Yaroslav Radovenchyk, Nadiya Kalinichenko

The results of studying the efficiency of coagulants based on aluminum compounds in the process of clarifying bentonite suspensions are given. It was found that in nature bentonite suspensions are precipitated very slowly, and the residual content of the solid phase in the clarified water is at 19mg/dm^3 at the initial turbidity of 34 dm^3. Processing of bentonite suspension by coagulant solutions based on aluminum compounds allows improving the result, but it cannot be considered satisfactory. Even with the coagulant dose of 50 dm^3 (by ion Al^{3+}) the volume of clarified water does not exceed 25 % of the original, and the residual solid phase concentration ranges from 1.6 to 19.2 dm^3. The adjustment of pH cannot significantly influence the situation. Neither the amount of clarified water nor residual concentrations of the solid phase are significantly changed. This situation is typical for all investigated coagulants – aluminum chloride, GOHA 2/3, coagulant "Polvak-68". It is quite evident that for clarifying bentonite suspensions it is necessary to use other coagulants or combine a simultaneous use of the coagulants with flocculants. Applying the methods, which do not use additional chemical agents can be another best way out.

Keywords: turbidity, precipitation, coagulant, aluminum, bentonite, clarification, residual concentrations, drinking water.

References

1. Mikhailov, V., Dobrovolsky, A. (1991). General hydrology. High. sch., 368.
2. Fylypchuk, V., Klimenko, M., Tkachuk, K. (2013). Industrial ecology. Rivne: NUVHP, 494.
3. Drozd, N., Goresky, C. (1989). Stick suspended sediment of rivers in Ukraine. Hydrological studies and calculations. Type of USSR, 106–120.
4. Gumen, S., Darienko, I., Evelson, E, Rusanova, L. (2001). Modern chemical reagents application for low turbidity colored water treatment. Water supply and sanitary equipment, Vol. 13, 12–15.
5. Bousely, J.-F., Losada, C., Zydowisz, Ph. (2001). Chemical reagents application in water production. E*au. Ind. Nuisances*, Vol. 256, 45–49.
6. Vasilyeva, E., Volkova, I., Timasheva, N. (2005). Coagulants application in water production. Chemistry and chemical technology progress. Vol. 19, № 6, 10–11.
7. Novakov, I., Radchenko, S., Bykadorov, N., Radchenko, Ph. (2005). Aggregative effect of inorganic compounds based on polyhydroxy aluminum chloride in kaolin water dispersion. Chemistry and chemical technology, Vol. 48, № 3, 24–26.
8. Augiler, M., I. Saez, J., Liorena, M., (2002). Coagulants and flocculants application for waste water clarification, Afinidad, Vol. 59, № 501, 521–529.
9. Dimova – Todorova, M., Dobrevsky, I., Panayotova, T. (2004). Chemical treatment of natural water with coagulation. Desalination, Vol. 164, № 1, 71–76.
10. Gomelia, M., Krysenko, T., Shabliy, T. (2004). Polyhydroxy aluminum generation and its efficiency evaluation for water clarification. Eco Technologies and resource supply, 2, 49–52.
11. Radovenchyk, Ya., Kostritsia, A., Radovenchyk, V. (2013). Flocculants for natural water clarification. Eastern-European Journal of Enterprise Technologies, Vol. 4, №6 (64), 23–26.

THE PROBLEM OF ELECTRICAL INJURY DURING THE OPERATION OF ELECTRICAL INSTALLATIONS IN UNDERGROUND WORKINGS OF IRON-ORE MINES (p. 21-25)

Oleg Sinchuk, Aleksandr Kharitonov

A safety state assessment in the application of electrical power at mining enterprises is given in the research materials. A prevention assessment of electrical injury state in domestic mining industry is given, and the basic data on the classification of electrical injury causes and the study of electrical injury emergence in the mining industry are presented.

In accordance with the target goal the issues for further studies on the preparation of managed decisions on electrical injury prevention are given.

The analysis of electrical injury specifics in the mining works shows the need for a more thorough study of the causes of its emergence on the basis of the studies of factors influence, involved in the formation of electrical injury-risk situations and negative effects on the reliability of electrical equipment and electrical means. These studies should be the basis for developing a set of preventive measures aimed at effective reduction of electrical injury.

The justification and development of methodological principles of identifying the cause-and-effect relations of the system "man - environment - electrical installation" in the direction of electrical injury emergence in the system "man - iron ore production - electrical systems" will allow to prepare managed decisions on electrical injury prevention in the mining industry.

The research results will allow to develop measures to improve the safety of electrotechnical complexes and the systems of mining enterprises, and in this case specifically in iron-ore mines.

Keywords: electrical safety, electrical injury, electrical installation, prevention assessment, iron-ore production, gravity rate, tendency.

References

1. Stogniy, B. S., Kirilenko, O. V., Prakhovnik, A. V. (2011). The main parameters of the energy supply of the national economy for the period up to 2020. Kiev, Institut Electrodynamics of NAS of Ukraine, 275.
2. Babez, E. K., Shtanko, L. A., Salganik, V. A. (2011). Collection of technical and economic parameters of mining enterprises of Ukraine in 2009 - 2010 years. Analysis of the global iron ore market conditions IORM 2004. Krivoy Rog, Dim Vidavnichy, 329.
3. Azaryan, A. A., Vilkul, Yu. G., Kaplenko, Y. P., Karamanits, V. O., Kolosov, V. O., Morkun, V. S., Pilov, P. I., Sidorenko, V. D., Temchenko, A .G., Fedorenko, P. Y. (2006). Energy-saving geotechnologies Complex at mining and processing of mineral raw, technical means of monitoring with control system and optimization of mining enterprises. Krivoy Rog, Mineral, 219.
4. Puchkov, L. O., Pivnyak, G. G. (2010). Electrification of mining: Textbook for Universities. National Mining University, B.1, 503.
5. Tsapenko, E. F., Shkundin, S. Z. (2008). Electrical safety at mines. Izdatelstvo MNMU, Moskow, 103.
6. Sinchuk, O. N., Guzov, E. S., Likarenko, A. G., Zhivotovsky, A. G. (2009). Electrical safety at mine haulage. Technika, Kiev, 188.
7. Kieback, D. (1983). Metodon der Erfassung und Auswertung von Arbeitsunfallen in der Bundesrepublik Deutschland. Buletin des Schweiserischen Elektrotechnischen Vereins, 12, 74.
8. Kieback, D. (1980). Die zeitliche Entwiklunco todlicher Stromunfalle in der Bunderepublic Deutschland. Elektrotechnische Zeitschrift, 1, 101.
9. Gordon, G. Ju. (1973). Rassledovanie i analiz proizvodstvennogo jelektrotravmatizma. Metodicheskie rekomendacii i ukazanija. VNII ohrany truda VCSPS, 62.
10. Ehlers, Theodor Experimentelle Untersuchgen zur personlechkeits – bedingte Unfallgefahr-dung (1964). Dissertation Philosophischen Fakultat der Philipps. Universitat Theodor Ehlers. Bremen, 252–279.
11. Hartan, T. (1977). Der Unfaller. Soziale Sicherheit, 3, 85–90.
12. Buhtojarov, V. F. (1987). O verojatno staticheskom podhode k issledovaniju jelektrotravmatizma i razrabotke mer po ego preduprezhdeniju. Bezopasnoe vedenie rabot na razrezah. UkrNIIproekt, 12–26.

13. International Electrotechnical Commission. IEC Report Publication 60479-1 (1994). Effect of current on human beings and livenstock. Part 1. General aspects.
14. International Electrotechnical Commission (1987). Effects of current passing through the human body. Second edition. IEC Report Publication 60479-2, Part 2.
15. Bondarenko, E. A. (2012). Determination technique of overload capacity of contact voltage and currents. European Science and Technology. Wiesbaden, Germany, «Bildungszentrum Rodnik e. V.», Vol. II, 189–193.
16. Gladilin, L. V., Shchutskiy, V. I., Batsezhev, YU. G., Chebotarev, N. I. (1997). Electrical safety in the mining industry. Moscow, Bowels, 327.

IMPACT ASSESSMENT OF MUNICIPAL WASTES ON THE ECOLOGICAL STATE OF UKRAINE (p. 25-29)

Igor Trofimov

The problem of assessing the impact of municipal wastes on the ecological state of Ukraine, and the ways of its solution are given. The main purpose of the research was to assess the impact of pollution sources of municipal solid wastes on the environment, and to justify the effective recycling of municipal wastes. The impact of SMW pollution sources on the environment state was assessed. The negative impact of wastes on the environment of Ukraine was studied. The problem of solid municipal waste management in Ukraine and in the world was analyzed. It was found that incineration and landfilling of solid municipal wastes are inefficient technologies today as they do not solve the energy problem in the country because they do not allow to obtain alternative energy sources from wastes, as well as they have a negative impact on the ecological state of Ukraine. It was proved that the most effective way to reduce emissions of biogas (landfill gas) from solid municipal waste landfills into the atmosphere – is to collect and use it. Economic indicators of production projects and the use of landfill gas are cost-effective enough, especially when waste landfill is placed near industrial gas consumer. The research results can be applied in the field of ecology and environmental protection. The research results can be applied by ecologists, as well as power engineers and chemmotology experts in the establishment and management of alternative energy sources.

Keywords: ecology, environment, wastes, incineration, soil, atmosphere, biogas, waste landfills, energy, catalysts.

References

1. Efremov, I. S., Marchuk, S. V. (2013). Problems of handling hard domestic offcuts. IV allukrainian convention of environmentalists with international participation (Ecology-2013). Collection of the scientific articles. Publishing house “Dilo”, 31–33.
2. Statyukha, G. A. (2011). Steady development is conception, approaches and models. Analysis of the systems and information technologies. Materials of the International conference of SAIT, NNTU «KPI», 38.
3. Petrova, M. A., Voytovich, M. O. (2013). Directions of increase ecological safety of thermal utilization of hard domestic offcuts. IV allukrainian convention of environmentalists with international participation (Ecology-2013). Collection of the scientific articles. Publishing house “Dilo”, 77-80.
4. Parfenyuk, A. S., Toporov, A. A., Kutnyashenko, I. V. (2005). Effective ways decision of problem hard offcutsin Ukraine – indastrial termolys power rekuperation. Safety of vital functions, 12, 36–41.
5. Rotter, S. (2011). Incineration: RDF and SRF – Solid Fuels from Waste. Mechanical biological treatment. “Solid Waste Technology & Management”. Publication A. John Wiley and Sons, United Kingdom, Vol.1(1).
6. Orfanova, M. M., Pustogov, V. I. (2008). The use of mechenical-chemical processes for the decision of problems of utilization of waste. Ecology, 1(3), 71–73.
7. Bakharev, V. S. (2005). An estimation of level technogenic danger of industrial enterprises is in the conditions dustborne contamination of atmospheric air. Announcer KDPU, 5(34), 121-125.
8. Cheng, H. Y., Zang, A., Meng, Q. Li. (2007). Municipal solid waste fueled power generation in Chine: a case study of waste-to-energy in Changchun city. Environmental Science and Technology, Vol. 41, № 21., 7509–7515.
9. Grosso, M., Motta, A., Rigamonti, L. (2011). Efficiency of energy recovery from waste incineration, in the light of the new Waste Framework Directive. Waste Management, Vol. 30, № 7, 1238–1243.
10. Trufanov, A. V. (2005). Some problems of ecological enterprises in the area handlings the offcuts of production and consumption. Use and guard of natural resources in Russia, 1, 140–144.
11. Loboyko, A. Ya., Vekshin, V. A., Markov, N. B., Vorozhbiyan, M. I., Shapareva, L. P. (2010). Research of influence technology preparation of catalyst on distributing catalytically of active matter on the surface transmitter. Technology of catalysts and sorbents, 10, 59 – 62.
12. Orlyk, S. M., Soloviev, S. O. (2011). Palladium in Gas-Phase Processes of Environmental Catalysis in Palladium: Compounds, Production and Applications, Series: Material Science and Technology (Ed. Kenneth M.Brady). Nova Science Publishers, 356.
13. Fino, D., Russo, N., Badini, C. (2001). EuropaCat-V. Limerick, Ireland, Abstracts, Book 3, 7.P-07.
14. Rashidzadeh, M., Peyrovi, M. H., Mondegarian, R. (2000). Alumina-Based Supports for Automotive Palladium Catalysts. Reaction Kinetics and Catalysis Letter, 69 (1), 115–122.

ELECTROFLOTOCOAGULATION WASTEWATER TREATMENT OF LLC «KOLOMYIA MEAT-PROCESSING PLANT» (p. 30-34)

Julia Uhlyar, Iryna Borshchyshyn, Uliana Khromiak

The experimental studies of using bentonite clay of the Sokyrnytsia field in Khust district (Transcarpathian region) for wastewater treatment (WW) were conducted. They actively absorb such pollutants as sulfates, chlorides, heavy metals and others. Also, the use of bentonite in wastewater treatment makes it possible to reduce the load on the microorganisms in aerotanks, reduce the content of ammonia nitrogen, suspended substances and BOD_5 (biochemical oxygen demand) in WW.

The possibility of wastewater treatment of ”Kolomyia meat-processing plant” using natural montmorillonite, modified with iron hydroxide during electroflotocoagulation treatment. The optimum conditions of wastewater treatment process (sorbent dose, current density, duration of WW treatment) were determined. According to the results, the optimal parameters of the treatment process include: sorbent dose is 30 mg/dm^3, current density is 60 A/m^2, treatment time is 3 min.

Based on the analysis of the existing methods of industrial wastewater treatment and the obtained experimental data the most effective method was proposed and the feasibility of replacing the existing flow diagram of ”Kolomyia meat-processing plant” wastewater treatment was justified.

Keywords: sorbent, electroflotocoagulation, bentonite clay, wastewater treatment, current, pollutants, sedimentation, sumps, foam.

References

1. Kovalchuk, V. A. (2002). Facilities for meat processing factories wastewater purification. Bulletin of Ukrainian State University of Water Management, 5(18), 74–76.
2. Petrus, R., Maliovanyi, M., Varchol, Y., Odnorih, Z., Petrushka, I., Leskiv, H. (2003). Technologies for wastewater treatment with application of natural dispersive sorbents. Chemical Industry of Ukraine, 2(55), 20–22.
3. Avetisian, Yu. I., Kopanytsia, Yu. D., Argatenko, T. V. (2009). Optimal control of flotation module of meat processing factory wastewater degreasing. Issues of Water Supply, Wastewater Disposal and Hydraulics, 12, 78–88.
4. Sviridov, V. V., Sviridov, A. V., Nikiforov, A. F. (2006). Physical and Chemical Conditions of Microflotation. Ekaterinburg: VPO UGLTU GOU VPO UGTU – UPI, 578.
5. Timofeeva, S. S. (1993). Modern methods for meat processing factories wastewater treatment. Journal of Water Chemistry and Technology, 15(7–8), 571–572.
6. Harzanov, A. L., Drofeeva, O. A. (2010). Practice of meat processing factories wastewater treatment. Meat Industry, 68–71.
7. Piruzjan, A. V., Bokovikova, T. N., Najdenov, Ju. V. (2008). Jeffektivnye metody ochistki stochnyh vod mjasopererabatyvajushhih predprijatij. Fundamental’nye i prikladnye aspekty sozdanija biosferno-sovmestimyh sistem. Kubanskij gosudarstvennyj tehnologicheskij universitet. Krasnodar.

8. Khramenkov, S. V., Danylovych, D. A. (2006). Primary anaerobic purification of concentrated wastewater of food industry. Water Supply and Sanitary Engineering, 1, part 2, 28–32.
9. Sophonsiri, C., Morgenroth, E. (2004). Chemical composition associated with different particle size fractions in municipal, industrial and agricultural wastewater. Chemosphere, 55(5), 691–703.
10. Movchan, S. I., Shevchenko, A. I., Morozov, M. V. (2010). Instruction for Technology of Wastewater Treatment of Industrial Plants. Melitopol: TDAU.
11. Vodyanka, V. R., Makarov, A. S., Balakina, M. N., Boruk S. D., Kucheruk D. D. (2011). The Use of Thiosemicarbazyde in the Pressure-Driven Processes of Wastewater Teatment. Journal of Water Chemistry and Technology, 33(3), 199–201.

MICROBIOLOGICAL PROPERTIES OF NATURAL FILM–FORMING MATERIALS (p. 34-40)

Olena Struminska, Maria Baylyak, Sergey Kurta

Microbiological analysis of natural film-forming materials-biopolymers, their solutions and compositions based on them is considered; their physical characteristics, the impact on crop yield and research results are given in the paper.

The study was aimed at investigating the influence of compositions on germination and yield of plants, properties of aqueous solutions of biopolymers and compositions based on them, as well as studying their impact on various types of microorganisms. The optimum percent concentration of biopolymers (XA-0, 125 %, CMC -0,5 %, ST-2 %), which allows forming the optimal film thickness – from 15.5 microns to 19.5 microns, at which it dissolves fast enough, not clogging the seed surface, and the optimal ratio of fertilizers and micronutrients are selected.

Using microbiological methods it was determined that harmful microorganisms such as E. coli and mold fungi that cause diseases and damage seed grain do not develop in the studied biopolymers and compositions based on them. Thus, compositions are characterized by high hygienic indicators, and seeds, treated by them do not require additional treatment since they show bactericidal and partially fungicidal properties, inhibiting the growth of microorganisms.

Using the studied compositions allows to reduce the total expenditure of fertilizers and micronutrients by 9–107 times and provides increased crop yields up to 75–80 % compared to control plants.

Keywords: biopolymer, xanthane, carboxymethylcellulose, starch, composition, Escherichia coli, mold fungi, yield.

References

1. Dekina, S. S., Romanovskaya, I. I., Gromovoy, T. Y. (2011). Vliyaniye polimerov na protsessy assotsiatsii molekul lizotsima. Biopolymers and Cell. . Institut molekulyarnoy biologii i genetiki NAN Ukrainy, K., 6, 442–445.
2. Kalia, S., Kaith, B. S., Kaur, I. (2011). Cellulose Fibers: Bio– and Nano–Polymer Composites. Green Chemistry and Technology. Springer–Verlag Berlin Heidelberg, 737.
3. Belmares, H., Barrera, A., Castillo, E., Verhuegen, V. E., Monjarsa, M., Paltfort, G. A., Buequoye, E. N. (1981). New composites materials from natural hard fibers. Ind Eng Chem Prod Res Dev 20, 555–561.
4. Biopolímeri – al'ternativa pakuval'nikh materíalív. Available at: http://essuir.sumdu.edu.ua/bitstream/123456789/7745/1/Hurets.pdf
5. Palapa, N. V. (1998). Ekoloho–agrokhimichna ta fitosanitarna efektyvnist zakhysno–stymulyuyuchykh sumishey pryrodnoho pokhodzhennya ta inshykh zasobiv khimizatsiyi. Ahroekolohiya i biotekhnolohiya. Instytut ahroekolohiyi ta biotekhnolohiyi UAAN, 2, 103–106.
6. Manokhina-Timoshenko, O. V. (2010). Vpliv preparatu YEM-1 na yakist' zerna kukurudzi. Visnik Poltavs'koi derzhavnoi agrarnoi akademii. Naukovo-virobnichiy zhurnal. Poltava, 2, 180–182.
7. Khíga, T., Dzheyms, F. P. (2006). Korisní ta yefektivní mikroorganízmi dlya vedennya stalogo sil's'kogo gospodarstva ta vídnovlennya dovkíllya. Ekoterra, L'vív, 20.
8. Balanda, O. V., Chernega, N. G. (2011). Vpliv 6-BAP na aktivnist' fermentu sakharazi u roslinakh kukurudzi za riznikh temperaturnikh umov. Naukovi dopovídí Natsional'nogo universitetu bioresursiv i prirodokoristuvannya Ukraíni. Elektronne fahove vidannya, № 3. Available at: https://archive.is/1Uja1
9. Voronova, N. L., Kozyakov, V. Y., Yuferov, A. M. (07.04.1988). Sklad dlya peredposivnoyi obrobky zeren. SSSR № 1386071. MKY A 01 S 1/06, UDK 631.531.17(088.8).
10. Kvyatkovskyy, A. F. (1986). Zastosuvannya mikrodobryv. Spravochnyk kukuruzovoda. K., Urozhay, 51–60.
11. Struminska, O., Kurta, S., Kutsela, O. (2013). Vykorystannya biopolimernykh kompozytsiy dlya ahrokhimichnoyi tekhnolohiyi peredposivnoyi obrobky nasinnya, 4, 74–78.
12. Singh, B., Gupta, M., Mohanty, A. K, Misra, M., Drazel, L. T. (2005). Natural fibers, biopolymers and biocomposites, Chap 8. Taylor & Francis, New York, 261–290.
13. Mohanty, A. K., Misra, M., Drazel, L. T. (2005). Natural fiber, biopolymers and biocomposites. Taylor & Francis, New York, NY, 896
14. Khimicheskaya entsiklopediya. (1988). M., Sov, Vol 1, 625.
15. Gamini, A., De Bleijer, J., Leute, J. C. (1991). Physicochemical properties of aqueous solutions of xanthan: an NMR study. Carbohydr. Res., 33–47.
16. Atrin, N., Sophia, L., Rukmal, Cheng., Abeysekera, M., Anthony, Robards, W. (1999). Localisation of Amylose and Amylopectin in Starch Granules Using Ensyme. Gold Iabelling 11 Starch. Nr. 5, 163–172.
17. Bol'shaya meditsinskaya entsiklopediya (1981). M., Sov. Entsiklopediya, Vol. 15, 576.
18. Borysov, L. B., Freydlyn, Y. S. (1985). Kratkyy spravochnyk mykrobyolohycheskoy termynolohyy. Meditsina, 136.
19. Kornelaeva, R. P., Stepanenko, P. P., Pavlova, E. V. (2006). Sanytarnaya mykrobyolohyya syrya y produktov zhyvotnoho proyskhozhdenyya, 15–18.
20. Pyroh, T. P. (2004). Zahalna mikrobiolohiya. NUKHT, 471.
21. Vekirchyk, K. M. (2001). Mikrobiolohiya z osnovamy virusolohiyi. K., Lybid', 312.
22. Strumynskaya, E., Kurta, S., Kutsela, O. (2013). Syntez y svoystva biopolymernykh penkoobrazuyushchykh kompozytsyy dlya peredposevnoy obrabotky semyan s/kh kulur. Nauka vchera, sehodnya, zavtra. Novosybyrsk, Yzd. «SybAK», 6 (6), 25–37.
23. Struminska, O. O., Kurta, S. A. (2012). Biopolymers for Presowing Treatment of Seed. Abstracts VII Polish–Ukrainian conference polymers of special application, Radom–Swieta Katarzyna. Poland, September 24–27, 73.
24. Furzikova, T. M., Serhiychuk, M. H., Vlasenko, V. V., Shvets, Y. V., Pozur, V. K. (2006). Mikrobilohiya. Praktykum. K., Fitosotsiotsentr, 210.
25. Meynel, Dzh., Meynel, É. (1967). Éksperymentalnaya mykrobyolohyya (teoryya y praktyka). Myr, 347.
26. Struminska, O. O., Kurta, S. A., Kutsela, O. Y., Kozak, T. I. (2013). Ahroekolohichni aspekty tekhnolohiyi peredposivnoyi obrobky nasinnya. Khimiya, ekolohiya ta osvita. Poltava, RVV PDAA, 180.
27. Porívnyannya produktivností kukurudzi na zerno pri bezzmínnomu viroshchuvanní ta v sívozmíní. Available at: http://pdaa.edu.ua/sites/default/files/studconf/35.pdf.
28. Kurta, S. A., Struminska, O. O., Kurta, M. S. (2011). Polimerni plivkoutvoryuvachi dlya peredposivnoyi obrobky nasinnya. Visnyk Prykarpatskoho natsionalnoho universytetu imeni Vasylya Stefanyka. Seriya Khimiya, , Ivano–Frankivsk, Hostynets, Vol. XIII, 122–129.

TECHNOECONOMIC STUDY OF HIGH-TEMPERATURE ACID SLUDGE PROCESSING IN MOLTEN MEDIUM (p. 41-44)

Marat Glikin, Julia Shovkoplyas, Vadim Tarasov

Throughout the territory of Ukraine 2 million tons of hazardous wastes are accumulated in outdoor areas. Recently, the determination to solve the problem of waste management is increased.

Acid sludges are wastes of hazard class 2, containing free sulfuric acid (up to 70%) and organic part (mostly high-molecular aromatic compounds), which complicate the effective disposal. The problem state of acid sludges is considered and the main directions in their processing are defined. The combination of systems with a high-temperature coolant and aerosol nanocatalysis on an autonomous mobile unit, allowing to dispose acid sludges not less than 99.99 % is first considered. A basic energotechnological scheme including stages of preparation, high-temperature oxidation in sodium chloride melt and catalytic flue gas final purification in the aerosol reactor with obtaining electricity and sulphates, is proposed. The technicoeconomic analysis showed that the pay-back period of capi-

tal investment could reach 2 years. The obtained results will resolve the problem of half a million tons of acid sludges in Ukraine.

Keywords: acid sludge, melt, oxidation, catalytic flue gas final purification.

References

1. Zakon Ukrai'ny N 2818-VI (2011). Pro Osnovni zasady (strategiju) derzhavnoi' ekologichnoi' polityky Ukrai'ny na period do 2020 roku. Vidomosti Verhovnoi' Rady Ukrai'ny (VVR), 26, 218. Available at : http://zakon4.rada.gov.ua/laws/show/2818-17
2. Rozporjadzhennja KM Ukrai'ny № 577-r (2011). Pro zatverdzhennja Nacional'nogo planu dij z ohorony navkolyshn'ogo pryrodnogo seredovyshha na 2011-2015 roky. Urjadovyj kur'jer, 135. Available at : http://zakon4.rada.gov.ua/laws/show/577-2011-%D1%80
3. Hoornweg, Daniel, Freire, Mila; Lee, Marcus J., Bhada-Tata, Perinaz, Yuen, Belinda (2011). Cities and Climate Change : Responding to an Urgent Agenda. World Bank. © World Bank. Available at : https://openknowledge.worldbank.org/handle/10986/2312 License: CC BY 3.0 IGO.
4. Ryoko, Seguchi, Yasuhiko, Hotta (2013). Best Practices and Recommendations for Waste Reduction towards Sustainable Consumption (FOE JAPAN Website). Available at : http://www.foejapan.org/en/waste/policy/pdf/140227.pdf
5. Spichak, Ju. N., Kostiv, I. Ju., Golovchak, V. F., Sadovyj, Ju. V., Kravec, R. V. (2010). Protection of aquifers from petroleum products contamination. Tehnogenno-ekologichna bezpeka ta cyvil'nyj zahyst, 1, 124–128. Available at : http://dspace.nbuv.gov.ua/handle/123456789/39701
6. Dvorjaninov, N. A., Zorin, A. D., Karataeva, E. N. (2007). Novye tehnologicheskie reshenija dlja pererabotki kislyh gudronov i nefteshlamov v tovarne vidy produkcii. Waste recycling, 4, 12–15. Available at : http://wasterecycling.ru/resources/itf5e1d16ff96d-11db99dbccf722b65740/cd6e6ab83798465eb818d2132c13cbfb.pdf;jsessionid=5FE0966DE4EDDCFBBFB23FACF9C3B763.
7. Kolmakov, G. A., Grishin, D. F., Zorin, A. D., Zanozina, V. F. (2007). Environmental aspect of storage of acid tars and their utilization in commercial petroleum products (Review). Petroleum Chemistry, Vol. 47, Issue 6, 379—388.
8. Glikin, M. A., Shovkoplyas, Yu. O., Tarasov, V. Yu. (2007). Doslidzhennya processu znesulurennya kislogo gudronu. Visnik of the East-Ukrainian national university named after Volodymyr Dal. Scientific journal, № 17 (188), Part 1, 94–98.
9. Glikin, M. A., Shovkoplyas, Yu. O., Tarasov, V. Yu. (2013). Okislenie vysokomolekuljarnyh uglevodorodov v rasplave vysokotemperaturnogo teplonositelja. Eastern-European Journal of enterprise technologies, Vol. 2, № 6 (62), 35–39.
10. Kudrjavcev, S. O. (2012). Doslidzhennja vplyvu mehanohimaktyvacii' na kinetychni harakterystyky procesu vydalennja oksydiv nitrogenu z dymovyh gaziv vid spaljuvannja vugillja v umovah aerozol'nogo nanokatalizu. Visnik of the East-Ukrainian national university named after Volodymyr Dal. Scientific journal, № 17 (188), Part 1, 39–43.
11. Himija Ukrainy i mira. Available at : http://ukrchem.dp.ua/
12. National Electricity Regulatory Commission of Ukraine. Available at : http://www.nerc.gov.ua/

IMPROVING THE EFFICIENCY OF CHEMICAL METHOD OF WEED CONTROL IN MAIZE CROPS OF THE RIGHT-BANK FOREST-STEPPE OF UKRAINE (p. 45-49)

Ihor Movchan

The main task of modern technologies of growing maize for grain is to obtain maximum yields, the solution of which is impossible without effective weed control. Herbicides are among the most effective measures to reduce weed infestation. However, long use of herbicides in maize crops decreases their efficiency. As a result of literature sources analysis, it was found that solving this problem is possible using surfactants and tank mixtures of herbicides in working solutions of herbicides. At the same time, there are no data on the influence of ammonium nitrate, Folicare and Enposan as surfactants on the efficacy of herbicides Milagro and Titus. Using tank mixtures of herbicides Milagro, Calista combined with surfactant ATPlus in maize crops for grain also remains uninvestigated.

It is determined that mixed type of weed-infestation, among which late spring types of Echinochloa crus-galli (L.) Roem., Setaria glauca L., Galinsoga parviflora Cav., Chenopodium album L., Amaranthus retroflexus L. take the largest share, is formed in maize crops. The basic amount of weeds appears during the period 30.05-20.06. It is found that a significant decrease in the yield of 0.34 and 0.28 t/ha is observed in the presence of 10 pieces/m^2 of plants of Echinochloa cruss-galli L or 15 pieces/m^2 of Chenopodium album L respectively.

Using surfactants in the working solutions of herbicides improves phytotoxicity and allows to reduce the consumption rate of preparations by 25 %.To expand the action range of preparations and the presence of weeds of different biological groups in maize crops it is necessary to use the tank mixture of herbicides Milagro, 1.0 l/ha, Callisto, 0.25 l/ha and ATPlus 1.0 l/ha. A number of measures, which ensure improving chemical method of weed control and increasing maize yield, is proposed.

Keywords: maize, weeds, harmfulness, herbicides, surfactants, yield.

References

1. Food and Agriculture Organization of the United Nations (2013). Available at: http://faostat.fao.org/site/424/DesktopDefault.aspx?PageID=424#ancor.
2. Zadorozhny, V. S., Movchan, I. V. (2012). Weeds in crops of corn. J Plant Prot, 2, 9–11.
3. Mahmoudi, G., Ghanbari, A., Hossainpanah, F. (2013). Physiological indices of weed species effects at different density on corn (Zea mays L.) growth. Proc.16th EWRS Symposium, Samsun, 36.
4. Uremis, I., Uludag, A., Ulger, A. C., Cakir B. (2009). Determination of critical period weed control in the second crop corn under Mediterranean conditions. Afr J Biotech, 8, 4475-4480.
5. Food and Agriculture Organization of the United Nations (2013). Available at: http://www.faostat.fao.org/site/339/dfault.aspx.
6. Ziska, L. H. (2000). The impact of elevated CO2 on yield loss from a C3 and C4 weed in field-grown soybean. J Global Change Biology, 8, 899-905.
7. Valerio, M., Tomecek, M. B., Lovelli, S., Ziska, L. H. (2011). Quantifying the effect of drought on carbon dioxide-induced in competition between a C_3 crop (tomato) and a C_4 weed (Amaranthus retroflexus). J Weed Research, 51, 591-600.
8. Ward, J. K., Tissue, D. T., Thomas, R. B., Strain, B. R. (1999). Comparative responses of model C_3 and C_4 plants to drought in low and elevated CO_2. J Global Change Biology, 5, 857-867.
9. Petrychenko, V., Borona, V. & Zadorozhny, V. (2005). The problem of resistance and effective weed control in maize. J Herbologia, 6(1), 35-40.
10. Pacanoski, Z. (2010). Role of adjuvants on herbicide behavior: a review of different experiences. J Herbologia, 2010, 11(2), 67-79.
11. Borona, V. P. Karasevich, V. V. & Solonenko, V. M. (2005). Enposanu role in reducing the consumption rates of herbicides. Collected Papers of the International Conference "Pathogenic bacteria. Fitontsydolohiya. Allelopathy". Zhitomir, Ukraine, 196-200.
12. Zadorozhny, V. S. (2001). Regulation of weeds in crops of corn silage. Forage and Fodder, 47, 138-140.
13. Sabluk, S. V. (2005). Prospects for the use of adjuvant silvet the application of pesticides. J Agronomist. 1, 82-85.
14. Baric, K., Ostojic, Z. & Scepanovic, M. (2013). The influence of adjuvants on Amaranthus retroflexus L. control with topremazone. Proc. 16th EWRS Symposium, Samsun, 239.
15. Sobiech, L. & Skrzypczak, G. A. (2013). Efficacy and surface tension of tritosulfuron modified by adjuvants. Proc. 16th EWRS Symposium, Samsun, 219.
16. Idziak, R., Woznica, Z. & Sobiech, L. (2013). Effect of oil and mineral adjuvants on efficacy and physico-chemical properties of foramsulfuron and iodusufuron spray mixture. Pak. J. Agri. Sci., 50(4), 671-676.
17. Trybel, S. O. (2001). Methods of testing and use of pesticides. Kyiv, Ukraine: Svit, 448.