ABSTRACT AND REFERENCES

TECHNOLOGY OF ORGANIC AND INORGANIC SUBSTANCES

OXIDIZATION OF 4-NITROTOLUENE BY NITRIC ACID UNDER EXCESSIVE PRESSURE AND HIGH TEMPERATURES (p. 4-8)

Andrey Bushuyev

The article studies the kinetics of oxidation of 4-nitrotoluene by nitric acid under excessive pressure and high temperatures. The article investigates the influence of temperature and duration of oxidation on the qualitative and quantitative characteristics of the product - corresponding 4-nitrobenzoic acid.

The determination of content of 4-nitrobenzoic acid was carried out by the titration method and electrometric titration.

It was found that with proper choice of parameters, namely, the pressure in the reactor 60 atm, temperature 180 ° C, duration 15 minutes and modules HNO3 = 2, the oxidation by 30% nitric acid can be carried out with high efficiency with maximum output of 4 -nitrobenzoic acid 95%. Thus obtained desired product is characterized by high quality (98,5-99,0% of 4-nitrobenzoic acid).

It was found that the increase of the concentration of nitric acid over 45-50% leads to nitration of 4-nitrotoluenu to aromatic ring. Taking into account the use of the regenerated nitric acid it was recommended to limit the upper concentration to 50%.

Thus, the results of these studies can be used to optimize obtaining of 4-nitrobenzoic acid at factories for its synthesis.

Keywords: oxidation of 4-nitrotoluen, 4-nitrobenzoic acid, nitric acid, pressure, temperature.

References

1. Tchekalin M.A., Passet B.V., Ioffe B. A. (1980). Technology of organic dyes and intermediate Products, (2) Leningrad, USSR: Chemistry Publishing.
2. V.G. Suscheev, E. N. Vishnevskiy, Y.V. Dolmatov, V.F. Selivanov, M. M. Aleksandrov. The receiption of p-nitrobenzoic acid by the oxidization of p-nitrotoluene by nitric acid under pressure. (1982). Russian Journal of Applied Chemistry, 55 (8), 1904-1907.
3. Russell G.A., Moye A.J., Janzen E. (1967). Oxidation of carbanions. Oxidation of p-nitrotoluene and derivatives in basic solution. J. Organ. Chem., 32 (1), 137-146.
4. Radhakrishnamurti P.S., Mahapotro S.N. (1976). Kinetic evidence for radical-anions in the oxidation of p-nitrotoluene by alkaline hexacyanoferrate (III) in aqueous dimethyl sulphoxide. Indian J. Chem., 14. (8), 613-614.
5. Author's certificates of the USSR **C** 07 **C** 79/46. The continuous way of receiving of the p-nitrobenzoic acid / Vishnevsky E. N, Ignatyev O. D., Laskin V. M., Lekomtsev A. I. Nagradsky M.I., Sushcheev V. G., Udamova N. P.; declared 25.09.86. published . 07.09.88
6. P.S. Radhakrishnamurti and S.N. Mahapatro, "Kinetic Evidence for Radical Anions in the Oxidation of 4-Nitro and 2,4-Dinitrotoluenes by Alkaline Hexacyanoferrate (III) in Dimethyl Sulphoxide," Indian J. Chem., 1976, 14A, 613.
7. Efros L.S., Gorelik M.V. (1980). Chemistry and technology of intermediate products, Leningrad, USSR: Chemistry Publishing.
8. Pat. SE 202125, C 07 c / 12 o : 14. Förfarande för seliktiv ftallning avp-nitrobensoeszra gemon oxidation av en isomerblandning av o-, м-, och p-nitrotoluener / Mayurnik G.; declared 8.04.57. published 22.02.66.
9. Atroshchenko V. I., Kargin S.I. (1970). Technology nitric acid. Moscow, USSR: Chemistry Publishing.
10. Titov A. I. (1963). The free radical mechanism of nitration. Tetrahedron, 19 (4), 557-580.

STUDY OF THICKENERS SYNTHESIZED ON THE BASIS OF POLYETHOXYLATE MODIFIED WITH DIISOCYANATES (p. 8-11)

Anna Hlukhova

The article studies the new synthetic thickeners of urethane type in pigment printing of fabrics with compositions prepared on the basis of urethane resins. The article presents the influence of the urethane thickeners and the system of solvents used in the preparation on pigment printing quality compared with the standard thickeners. It also presents the influence of organic solvents on the rheological behavior of thickeners based on the urethane thickeners.

For the study two different thickeners were prepared using a strong base of the polymer synthesized from polyethoxylate, modified with diisocyanate and two different solvent system for dissolving the solid base and form a solution of thickener. From a solution of the thickener by deterioration of the solvent we obtained a thickener. It was found that the thickener prepared with propylene glycol provides a higher color intensity compared to those the solid base of which was dissolved with ethylene glycol. It was shown that the solvent also affects the stability of the colors to washing and friction, affects the viscosity of the system, the clarity of the contour and painting of underside of the fabric.

Effect of thickeners on printing results is explained by their different rheological behavior.

Keywords: urethane thickener, fabric, quality, printing, solvent, rheology.

References

1. Volkhonsky, N.S., Kazaryan, M.Z., Senachov, A.V., Sadov, F.I. (1972). Sinteticheskу zagustitel sopan dlya pechati kubovymi krasitelyami. Krashenie i otdelka tkany, №1, 6-12.
2. Krichevskii, G.E., Korchagin, M.V., Senachov, A.V. (1985). Khimisheskay tekhnologiy voloknistykh materialov. Moscow, USSR: Lenprombytizdate, 610.
3. Kargina, V.A. (1972). Sovetskya intsklopediy, Intsklopediy polimerov. Moscow, USSR: 3, 43.
4. Antonenko, T.A., Laprol, D.Z. (1993).Oligomerny zagustitel dly vodnykh system. Informatsione listok №116, seriy R.61.65.09. Vladimir TSNTI, 2.
5. Mishchenko, A.V., Yanovskaya, O.V. (1993). Primenenie upronila v kachestve zagustitelya pigmentnykh pechatnykh krasok. Kiev, Ukrain: resursosberegayushchie tehnologii, 37 – 38.
6. Mishchenko, A.V., Kostyrya, A.V., Antonenko, T.A. (2000). Struktura i mikhanizm reologicheskogo povedeniy poliuritanovykh geley. Ukrainsky khimichesky zhurnal, 66, №2, 120 – 123.
7. Kirillov, E.A. Zwetovedenie (1987). Moscow, USSR: Legprombutisdat, 128.
8. Cross, M.M. (1965). Rheology of non – Newtonian f-luids: A new flow eguation for pseudoplastic systems , I. Colloid Sci, 20, 417 – 437.
9. Nakajima, N. (1999). Academic rheology and industrial rheology – a ptrsonal reflection (to the years 1960 – 1970). Appl. Rheol, 9(3), 116 – 125.
10. Cheung, C.V., Cebon, D. (1997). Experimental study of pure ditumens in tension, compression and shear. Jeurnal of Rheology, 41(1), 45 – 73.

EVALUATION OF INFLUENCE OF MULTYFUNCTIONAL ADDITIVES ON OPERATIONAL AND TECHNICAL PARAMETERS OF PETROL (p. 12-16)

Iryna Roik, Aleksandr Vasilkevich, Sergii Bondarenko, NikolayStepanov

The article grounds the usefulness of multifunctional additives for petrol in order to improve the environmental characteristics of the performance of internal combustion engines. On the basis of surfactants and antioxidants a number of additives was developed. Choosing antioxidants was based on determination of their thermal stability. The influence of additives on the octane number of petrol and the process of

cool-flaming oxidation of hydrocarbon fuel was studied. For the research a high-precision octanometer was used, where the octane number of petrol is determined solely by the nature and magnitude of the thermal effects associated with the occurrence of only cool-flaming oxidation reactions. Test results show that additives influence the nature of the oxidation processes. The greatest positive effect of the antioxidant 4,4 '-dioctyldiphenylamine was revealed. According to the results it was concluded that it is reasonable to use the high-temperature antioxidant 4,4 '-dioctyldiphenylamine to modify petrol.

Keywords: petrol, additives, antioxidants, surfactants, antiknock value, cool-flaming oxidation octanometer, thermal effect, induction time, characteristics.

References

1. Gureev, A., Azev, V. (1996). *Automobile gasoline. Properties and application.* Moscow: Oil and Gas.
2. "Ecological Future" (2012). Retrieved from: http://www.ekomaybutne.com/ua.
3. Environmental protection and rational use of natural resources-2011. Col. Works of Materials of the XXI National Scientific Stud. and post-graduate Stud. Conf. (2011). Donetsk: DonNTU.
4. Emissions of certain pollutants and carbon dioxide into the atmosphere (2011). Retrieved from *State Statistics Service of Ukraine*: http://www.ukrstat.gov.ua.
5. Chabannyi, V. (2008). *Fuel and Lubricant Materials, Technical Fluids and Supporting Systems.* Kirovograd: Central Ukrainian Publishing.
6. Yarmolyuk, B., Korotkov, N., Bereza, L. (2006). Trends in the usage of gasoline additives. *Catalysis and Petrochemistry. 14*, 53-70.
7. Danilov, A. (2000). *The Usage of Additives in Automobile Hydrocarbon Fuels.* Moscow: Chemistry.
8. Nikitina, E., Pavlov, D. (2010). Detergents for Gasoline – Step-by-Step. The History of Development. *Scientific and Technical Journal "World of Oil Products. The Oil Companies' bulletin". 1*, 3-9.
9. Stepanov, N., Vasylkevych, O. Ledovskih, V., Yushchenko, O., Bondarenko, S., Popova, L., Lesyk, T. (2011) Method of operational definition of gasoline Octane Number. Ukraine: IPC G 01 N 25/20 (2006/01) (Patent).
10. Stepanskyi, Y., Evmenenko, N., Jablonskyi, G. (1980). The Correlation between the Octane Number and some Parameters of gasoline oxidation. *Chemistry and Technology of Fuels and Oils. 8, 54-56.*
11. Kiselev, V., Kiselev, J. (2001). Alternative definitions antiknock gasoline and components. *Catalysis and petrochemistry. 9-10*, 77-79.

MODEL OF ADIABATIC NITRATION OF AROMATIC COMPOUNDS (p. 16-20)

Sergej Kondratov, Anna Krasylnikova

The article discusses the use of modern computer simulation techniques for the analysis and search of the best variants of an industrial process organization.

The main objective of the study is to develop a mathematical model of the adiabatic nitration of aromatic compounds. The use of modern methods of computer simulation for the adiabatic nitration will reduce energy consumption and amount of wastes.

The article presents a developed computer simulation model of stationary continuous adiabatic nitration. It permits to describe the process of nitration and removal of excess of heat by distillation of a part of the reaction mass.

The properties of the model were studied, the speed of convergence was determined. On the example of the nitration of benzene, it was shown that the process temperature, predicted by the model was close to the data.

The results of the research can be applied in practice for the design problems and optimal organization of the process.

Keywords: adiabatic nitration, aromatic compounds, benzene, stationary process, wastes, computer simulation

References

1. Greysh, A. (2004).The nitration of aromatic hydrocarbons on heterogeneous catalysts.Rus. Chem. Journal, V.48, № 6, 92-104.
2. Zhilin, V, Zbarsky, V. (2006).Synthesis and technology of nitro derivatives of benzene and toluene.Rus. Chem. Magazine, V.50, № 3, 104-115.
3. Nonoyama, N., Mori, T., Suzuki, H. (1998).Kioday-nitration. An alternative way to electrophilic aromatic nitro compounds on the basis of nitrogen trioxide. Journal of Organic Chemistry, № 11, 1591-1601.
4. Gorelik, M., Efros, L. (1992).Chemistry and Technology of aromatic compounds.Chemistry, 640.
5. Lisitsyn, V. (1987).Chemistry and Technology of the intermediates.Chemistry, 368.
6. Perevalov, V., Koldobski G. (1997).Fundamentals of design and equipment manufacturing organic synthesis.Chemistry, 154.
7. Quardos, P., Oliveira, N., Baptista, C. (2005).Continuous adiabatic industrial benzene nitration with mixed acid at a pilot plant scale.Chem. Eng. Journal, №108, 1-11.
8. Alexanderson, V. (1978).Continuous adiabatic process for the mononitration of benzene.United States Patent, №4, 091,042.
9. Rausch, A. (2009).Process for the preparation of nitrobenzene by adiabatic nitration.United States Patent, №US2009/0187051 A1.
10. Munnig, J., Pennemann, B. (2013). Process for the continuous preparation of nitrobenzene.United States Patent, №US2013/8,357,827 B2.
11. Berkman, B. (1964).Industrial synthesis of aromatic nitro compounds and amines.Chemistry, 344.
12. Victorov, M. (1977).Methods for calculating the physical and chemical quantities and applied calculations.Chemistry, 360.
13. Planovsky A. (1940).Special equipment industry organic intermediates and dyes.GNTIHL, 192.
14. Alekseev, E. Chesnokov, O., Rudchenko, E. (2008).Scilab: Decision engineering and mathematical problems.BINOM. Laboratory of Knowledge, 260.
15. Handbook of chemical. (1966).Gos. Scientific and Technical. ed. Chem. Literature, Vol 1, 1072.
16. Perry, R., Green, D. (1999).Perry's chemical engineers' handbook.McGraw-Hill, 2582.
17. Shikin, E., Plis, A. (1996).Curves and surfaces on the computer screen.Dialog-MIFI, 240.
18. Ueyles, C. (1989).Phase equilibria in chemical engineering. World, 304.
19. Kogan, V., Friedman, V., Kafarov, V. (1966).The equilibrium between liquid and vapor.Nauka, 1440.

INCREASE OF RESISTANCE OF POLYSTYRENE PAINTS WHEN INTRODUCING ORGANIC-MINERAL ADDITIVE (p. 21-26)

Valentina Loganina, Nadezhda Petukhova

The article presents the structure and production technology of organic-mineral additive designed for polystyrene paints as the structuring and dispersant additive, which presents mixed clay with adsorbed surfactant - a reaction product of alkylphenols with ethylene oxide OP-4. It was found that the adsorption of additive OP-4 is 0.00038 g/sm^2. The methods for the introduction of organic-mineral additive to formulation of the polystyrene paint were suggested.

The polystyrene structure of paint with low content of volatile compounds was designed for exterior and interior building products and designs. The coatings based on the developed polystyrene paint possess increased fracture strength.

It was determined that the introduction of organic-mineral additive to the formulation of polystyrene paint provides increase of grinding of paint, reduction of the coverage indicator from 160 to 112 g/m^2 , improvement of cohesive strength in 1,6-1,8 times, the modulus of elasticity

in 1.2 times, the proportion of the elastic deformation in 2 times and decrease of the proportion of plastic deformation in general deformation of coatings. It was revealed that the polystyrene paints have the best dispensing, and increased by 13% retention capacity. The coatings based on polystyrene paints possess higher quality of form, which is IV-V (coatings based on a reference structure V-VI).

Keywords: organic clay, polystyrene paint, deformation properties, the degree of dispensing, the degree of grinding, rheology

References

1. Mikitaev, AK Nanocomposite polymer materials based on organoclay. Plastics. - 2004. p. 45-50
2. McLauchlin, A.R. Preparation and characterization of organoclays based on an amphoteric surfactant. Journal of Colloid and Interface Science. – 2008. – T. 321. – № 1. – C. 39-43.
3. Loganina VI Petukhov N.A.Polistirolnye paint with low content of volatile compounds. Penza: PGUAS, 2009. – 82c.
4. Loganina, V.I. Prospects for the manufacture of organic and mineral supplements on the basis of domestic raw materials. Trans. Building. - 2009. - № 9. - P. 36-40.
5. Paul, D.R. The interlayer swelling and molecular packing in organoclays. Journal of Colloid and Interface Science. – 2005. – T. 292. – № 2. – C. 462-468.
6. Seki, Y. Paraquat adsorption onto clays and organoclays from aqueous solution. Journal of Colloid and Interface Science. – 2005. – T. 287. – № 1. – C. 1-5.
7. Fu, X.A. Swelling behavior of organoclays in styrene and exfoliation in nanocomposites. Journal of Colloid and Interface Science. – 2005. – T. 283. – № 2. – C. 373-379.
8. Loganina, V.I. Modification of the composition of the paint formulation polystyrene particles dispersed organoclay. News vuzov. Stroitelstvo. -2008. - № 8. - P.25-27.
9. Lee, K.M. Rheology of organoclay nanocomposites: effects of polymer matrix/organoclay compatibility and the gallery distance of organoclay. Macromolecules. – 2003. – T. 36. – № 19. – C. 7165-7178.
10. Sanzharovsky, A.T. Physical and mechanical properties of the polymer and paint. M.: Chemistry, 1978. -183p.
11. Loganina, V.I. Influence of organic and mineral supplements on the properties of polystyrene paints. Proceedings vuzov. Stroitelstvo. –2008. - № 5. - P.37-41.

MATHEMATICAL JUSTIFICATION OF BLENDING OF VEGETABLE OILS (p. 26-28)

Tatiana Matveeva, Pavel Petik, Zoya Fedyakina

Vegetable oils by 95 - 99% consist of triglycerides - esters of fatty acids and glycerine, and after refining their content increases to 98.5 - 99.5%. Human health is positively influenced by triglycerides, which contain the essential fatty acids ω-6 i ω-3 (linoleic and α - linolenic). It was found that there are no vegetable oils with balanced fatty acid structure in nature. Such oils can be produced artificially, for example by selection or genetic modification of oilseeds. The most technologically and therefore cost-effective is the method of mixing (blending) of oils. The article explains the choice of vegetable oils and offers a simple mathematical calculation of formulations of their mixtures, balanced according to fatty acid structure. The blendings calculated according to the equations can be used as food and for production of emulsion goods. Because of the nature of the Ukrainian market, we can assume that the product will be successful, because it will be affordable and good for health.

Keywords: vegetable oils, blendings, polyunsaturated fatty acids ω-6 and ω-3, essential fatty acids

References

1. Stepycheva, N. V. Fudko, A. A. (2011). Blended vegetable oils with optimized fatty acid composition. Chemistry of plant raw materials, 2, 27 – 33.
2. Alexandrovskyi, Y. A. (1991). Neuroses and lipid peroxidation. Moscow, USSR: Nauka.
3. Dotsenko, V. A. (2004). Theoretical and practical problems of supply of healthy and sick persons. Questions of nutrition, 6, 36 – 39.
4. Tutelyan,V. A, Sukhanov, B. P., Avstrievskyi, A. N. (1999). Biologicheski supplements in human nutrition. Tomsk, Russia: NTL.
5. Shazzo, R. I., Kasyanov, G. I. (2000). Functional Foods. M., Russia: Kolos.
6. Matveeva, T. V., Fedyakina, Z. P., Shapovalova, I. E., Petik, I. P. (2013) Blending oils with optimized fatty acid. Vestnik of NTU "KPI", 11, 116 – 120.
7. Arutyunyan, N. S., Kornena, E. P. (2004). Refining of oils and fats: Theoretical foundations, practice, technology equipment. St. Petersburg, Russia: Giord.
8. Zhmurina, N. D., Bolshakov, L. S., Litvinova, E. V. (2012). Soy fat emulsions optimized fatty acid composition. *Vestnik OrelGIET*, *3* (21), 160 – 162.
9. Curative salad oil (Options): pat. 2292149 Russia: MPC A 23 D 9/ 00. / Kovaleva O. N., Kovalenko G. A., Obukhov L. A.; applicant and patentee LLC «Delfa.» – № 2005104050/13; appl. 15.02.2005 ; publ. 27.01.2007, Bull. № 3. – 3 p.
10. Salad oil: pat. 2390158 Russia: MPC A 23 D 9/ 00. / Tabakaeva O. V.; applicant and patentee Tabakaeva O. V. – № 2009102148/13; appl. 22.01.2009, publ. 27.05.2010, Bull. № 15. – 4 p.
11. Nechaev, A. P., Kochetkov, A. A. (2005). Vegetable oils functionality. Oil industry, 3, 20 – 21.
12. Rudakov, O. B. Optimization algorithm of the fat phase spreads (2006). Oil industry, 3, 42 – 44.
13. A method of producing vegetable oil- mixtures: pat. 2437549 Russia: MPC A 23 D 9/ 00. / Zemlyak K. G., Okara A. I.; applicant and patentee state institution of higher professional education «Khabarovsk State Academy of Economics and Law.» – № 2010112184/13 ; appl. 29.03.2010; publ. 27.12.2011, Bull. № 36. – 10 p.

INFLUENCE OF ELECTROCHEMICALLY ACTIVATED WATER ON FERMENTATION ACTIVITY OF ALCOHOLIC YEAST (p. 29-33)

Nataliya Pankiv, Liubov Palianytsia, Ruslana Kosiv, Nataliya Berezovska

Nowadays a lot of researches are devoted to various methods of activation of water and aqueous solutions. Activated water has other specific properties. Under the influence of this water the fermentation activity increases and accumulation of biomass organisms improves, metabolism enhances, extraction properties improve and its antibacterial and antioxidant properties become apparent.

One of the methods of water treatment, which belongs to the physical, is an electrochemical activation. It is performed by transmission of electric current through electrodes that immersed in solution. Due to the semipermeable membrane the ion-exchange takes place, which results in change of the properties of the aqueous solution.

It is known, that electrochemically activated water has a significant effect on microorganisms. Addition of this water to culture media stimulates the generation of microorganisms and increases their activity, which are important parameters for biotechnological processes.

Therefore, the aim of the work was to study the influence of electrochemically activated water on the alcohol yeast as industrial micro-organisms in the production of fermentation products, including ethanol.

It was found that electrochemically activated water permits to increase the fermentation activity of the alcohol yeast. These results are of practical interest in biotechnology and microbiology in order to control metabolic processes of microorganisms.

Keywords: electrochemically activated water, yeast, fermentation activity, fermentation, generation.

References

1. Prilutskii, V.I., Bakhir, V.M. (1997). Electrochemically activated water: anomalous properties, mechanism of biological action. Moscow: VNIIIMT.
2. Leonov, B.I., Prilutskii, V.I., Bakhir, V.M. (1999). Physicochemical aspects of the biological action of electrochemically activated water. Moscow: VNIIIMT.
3. Kurtov, V.D. (2011). About the amazing properties of the electroactivated water. Kyiv: HUIKT.
4. Hanaoka K. Antioxidant effects of reduced water produced by electrolysis of sodium chloride solutions // Journal of Applied Electrochemistry, 2001. № 31. P. 1307–1313.
5. Kim Mi-Ja. Preservative effect of electrolyzed reduced water on pancreatic β-Cell mass in diabetic db/db mice / Mi-Ja Kim, Kyung Hee Jung, Yoon Kyung Uhm, Kang-Hyun Leem, Hye Kyung Kim // Biological & Phar-ma ceutical Bulletin, 2007. V. 30(2). P. 234-236.
6. Lee M.Y. Electrolyzed-reduced water protects against oxidative damage to DNA, RNA, and protein / M.Y. Lee, Y.K. Kim, K.K. Ryoo, Y.B. Lee, E.J. Park // Appl. Biochem. Biotechnol., 2006. V. 135(2). P. 133-144.
7. Li Y. Protective mechanism of reduced water against alloxan-induced pancreatic **β** -cell damage: Scavenging effect against reactive oxygen species / Y. Li, T. Nishimura, K. Teruya et al. // Cytotechnology, 2002. № 40. P. 139–149.
8. Shirahata S. Electrolyzed-reduced water scavenges active oxygen species and protects DNA from oxidative damage / S. Shirahata, S. Kabayama, M. Nakano, T. Miura, K. Kusumoto, M. Gotoh, H. Hayashi, K. Otsubo, S. Morisawa, Y. Katakura // Biochem. Biophys. Res. Commun. 1997. V. 234(1). P. 269-274.
9. Ye J. Inhibitory effect of electrolyzed reduced water on tumor angiogenesis / J. Ye, Y. Li, T. Hamasaki, N. Nakamichi, T. Komatsu, T. Kashiwagi, K. Teruya, R. Nishikawa, T. Kawahara, K. Osada, K. Toh, M. Abe, H. Tian, S. Kaba yama, K. Otsubo, S. Morisawa, Y. Katakura, S. Shirahata // Biological & Pharmaceutical Bulletin. 2008 . V. 31(1). P. 19-26.
10. Cloete T.E., Thantsha M.S., Maluleke M.R., Kirkpatrick R. The antimicrobial mechanism of electrochemically activated water against Pseudomonas aeruginosa and Escherichia coli as determined by SDS-PAGE / Journal of Applied Microbiology 107 (2009) 379–384.

EFFECT OF THE AMOUNT OF ETHANOL ON THE MELTING TEMPERATURE OF PALM OIL FRACTIONS (p. 33-35)

Pavel Petik, Igor Demidov, Victoriya Papchenko, Larisa Kuznetsova

The article discusses the fractionation process of the palm oil by crystallization from a solution in the organic solvent - ethanol, in order to obtain the fractions of palm oil, which are used for the production of margarine, milk fat replacers, cocoa butter, confectionery and cooking fats, soaps. As the objects of study of fractionation the palm oil was chosen because it contains a significant proportion of 2-oleodysaturated triacylglycerols, the bulk of which is presented by 2-oleodipalmitin, which is the most promising raw material for the production of cocoa butter substitutes. The study suggested the use of ethanol because it is a food substance unlike acetone and hexane. The presence of the solvent gives the possibility to achieve higher speed of crystallization, to obtain fractions with a narrow range of characteristics, to obtain the mid fraction of the palm oil. It also improves the efficiency of separation of solid and liquid fractions at the filtration stage. The effect of ethanol on the yield and melting temperature of fractions of the palm oil was studied.

Keywords: palm oil, ratio, fractionation, fraction, melting temperature, ethanol, solvent, crystallization.

References

1. Glodkiyi, F.F., Timchenko, V.K., Demidov, I.N. (2012). The technology of modified fats. Kharkov, Ukraine: Handbook of NTU "KhPI".
2. O' Brian, P. (2007). Fats and oils. Production, composition and properties, application. St. Petersburg, Russia: Profession.
3. Pantzaris, T.P. (2000). Pocket Guide to the use of palm oil. Malaysia: Department of Primary Industries.
4. Timchenko, V.K., Melnik, A.P., Lukina, E.A. (2005) Fractionation of palm oil using surfactant. Oil and fat complex, 1, 21–23.
5. Demidov, I.N. (2004). The use of ethanol in the oil industry. Oil and fat complex, 1, 21 – 23.
6. Demidov, I.N., Kuznetsova, L.N. (2010) Using ethanol fractionation of fats – promising technology. St. Petersburg, Russia.
7. Kuznetsova, L.N., Demidov, I.N., Papchenko, V.Y. (2012). Research fractionation of palm. Kharkov, Ukraine: Visnik NTU "KhPI".
8. DSTU 4439:2005. Stearin. General specifications. Kiev, Ukraine: 2006, 20.
9. ДСТУ 4438:2005 Olein. General specifications. Kiev, Ukraine: 2006, 18.
10. Pavlova, I.V. (2000). The theoretical and experimental basis for the development of production technology cocoa butter substitute. St. Petersburg, Russia.

OBTAINING AND INVESTIGATION OF EPOXIDE RAPESEED OIL AS A MODIFIER FOR ROAD BITUMEN (p. 36-38)

Yurii Hrynchuk, Volodymyr Starchevskyy, Mychailo Nykypanchuk, Volodymyr Hrynchuk

Petroleum bitumen, used for making asphalt coatings do not always meet the high quality standards. Therefore, they are modified by various modifiers. It was found that bitumen epoxy compounds of higher olefins based on renewable raw materials allows improving the operational characteristics of road surfaces. An urgent need of this work is to obtain epoxide rapeseed oil and to determine its properties in particular thermal stability. The most widespread way of preparation of epoxy rapeseed oils is epoxidation in the medium of formic acid and hydrogen peroxide. A thermal stability was investigated by comprehensive thermogravimetric, differential and thermal analysis, and infrared spectroscopy. Analyzing the results of comprehensive thermogravimetric, differential and thermal analysis and infrared spectroscopy, we can conclude that the ERO heating of to 130 ° C, it is thermally stable. These data allow us to determine the optimal conditions for making compositions for bitumen modification. Also in the the course of work we proposed a way epoxidation of oils by cutting process stages and without the use of solvent

Keywords: epoxide, rapeseed oil, epoxidation, thermal stability, bitumen, modified bitumen.

References

1. Hrynchuk Y.M., Nykypanchuk M.V. Epoxy compounds based on rapeseed oil as a modifier for bitumen [Epoksydni spoluky na osnovi ripakovoi olii yak modyfikatory dlya dorozhnikh bitumiv] - Bulletin of the National University «Lviv Polytechnic». Chemistry, technology, materials and their applications. Lviv 2011. - № 700. - P. 474-477.
2. Hrynchuk Y.M., Nykypanchuk M.V. Modification road asphalt epoxide olefins higher based on renewable raw, 15th International Symposium of Students and Young Mechanical Engineers Advances in Chemical and Mechanical Engineering. Poland, Gdansk-2012
3. Hrynchuk Y.M., Chaykivskyy O.V. Determining the number of epoxy asphalt compositions [Vyznachennya epoksydnoho chysla v bitumnykh kompozytsiyakh] International Youth Festival of Science «Chemistry and chemical technology.» Materials and the International Conference of Young Scientists (CCT - 2010). Ukraine, Lviv 2010. - P. 86.
4. Pyrih O.B. Peracetic acid epoxidation oils: Author. [Epoksyduvannya olii nadotstovoyu kyslotoyu]Dis ... candidate.

techn. sciences: 05.17.04 State. University «Lviv Polytechnic». - Lviv., 2000. - 18 p.
5. Kopach G.E. Improved technology obtaining epoxy plasticizers [Vdoskonalennya tekhnolohii otrymannya epoksydnykh plastyfikatoriv] Dis. candidate. techn. sciences: 05.17.04 State University «Lviv Polytechnic». - Lviv, 1996. - 124 p.
6. Hrynchuk Y.M., Nykypanchuk M.V. Improved methods of epoxidation of rapeseed oil [Udoskonalennya metodyky epoksyduvannya ripakovoi olii]Proceedings of the ten open scientific conference faculty members IPMFN, National University «Lviv Polytechnic», 2011
7. Hrynchuk Y.M., Hrynchuk V.M. Investigation of thermal stability of epoxy rapeseed oil [Udoskonalennya metodyky epoksyduvannya ripakovoi olii] II International Conference of Young Scientists Shemistry and Chemical Technology-2011., 2011. [Udoskonalennya metodyky epoksyduvannya ripakovoi olii]
8. H.-W Dibbern, R.M. Muller, E. Wirbitzki. / UV and IR Spectra Pharmaceutical Substances (UV and IR) and Cosmetic Excipients (IR) // Editio Cantor Verlag Aulendorf, 2002.
9. Shagidullin R. R., Atlas of IR spectra of organophosphorus compounds (Interpreted Spectrograms). Kluwer, Dordrecht, 1991. VII - 344 p.
10. Farhadyar N., Rahimi A., and Ershad Langroudi A., Synthesis and chracterization of inorganic-organic hybrid produced from tetraethoxysilane and epoxy-aromatic amine, Macro 2004, IUPAC World Polymer Congress, Paris-France, 2004.

JUSTIFICATION OF EXTRACTION OF CHLOROGENIC ACID FROM SUNFLOWER MEAL

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The importance of phenolic compounds of vegetable origin is determined by their positive effect on a human body and their ability to act as powerful antioxidants. For our country, the most widespread oil crop is sunflower. The predominant phenolic compound of sunflower kernels is the chlorogenic acid. Its basic amount is in the sunflower kernel. It was determined that the content of the chlorogenic acid in the sunflower meal reaches 1 - 3%. The sunflower meal is most commonly used as feed material for animals, despite the fact that it contains a lot of biologically valuable protein. The main factor limiting the use of sunflower protein in food formulations is the presence of the chlorogenic acid, which gives a greenish colour to protein products, which reduces their consumable qualities limiting or even precluding their nutritional use. The article justifies the possibility to obtain the chlorogenic acid as a by-product of the process of obtaining of protein concentrates from sunflower meal. This will significantly expand the scope application of sunflower proteins in food. The production of the chlorogenic acid will provide a natural antioxidant on compatible cost-effective technologies.

Keywords: phenolic compounds, chlorogenic acid, sunflower meal, ethanolic extraction.

References

1. Stevenson, D. E. & Hurst, R.D. (2007). Polyphenolic phytochemicals – just antioxidants or much more? Cell. Mol. Life Sci, 64, 2900-2916.
2. Karamac, M., Kosinska, A., Estrella, I., Hernandez, T. & Duen, M. (2012). Antioxidant activity of phenolic compounds identified in sunflower seeds. Eur. Food Res. Technol, 235, 221–230.
3. Anderson, J. W. (2003). Whole grains protect against atherosclerotic cardiovascular disease. Proc. Nutr. Soc., 62, 135-142
4. McCarty, M. F. (2004). Proposal for a dietary phytochemical index. Med. Hypotheses, 63, 813-817.
5. Cowan, M. M. (1999). Plant products as antimicrobial agents. Clin. Microbiol. Rev., 12, 564 – 582.
6. Pedrosa, M. M., Muzquiz, M., Garcıa-Vallejo, C., Burbano, C., Cuadrado, C., Ayet, G. & Robredo, L.M. (2000). Determination of caffeic and chlorogenic acids and their derivatives in different sunflower seeds. J. Sci. Food Agric., 80, 459–464
7. Pomenta, J. V. & Burns, E.E. (1971). Factors affecting chlorogenic, guinic and caffeic acid levels in sunflower kernels. J. Food Sci, 36, 490-492.
8. Weisz, G. M., Kammerer, D.R. & Carle, R. (2009). Identification and quantification of phenolic compounds from sunflower (Helianthus annuus L.) kernels and shells by HPLC-DAD/ESI-MSn. Food Chem., 115, 758–765.
9. Leung, J., Fenton, T.W. & Clandinin, D.R. (1981). Phenolic components of sunflower flour. J. Food Sci., 46, 1386–1393.
10. Gorshkova, L.M. & Rubina, L.V. (1977). Obtaining proteins from sunflower seeds. Oil industry, 12, 16-17.
11. Taha, F. S., Mohamed, G.F., Mohamed, S.H., Mohamed, S.S., & Kamil, M.M. (2011). Optimization of the Extraction of Total Phenolic Compounds from Sunflower Meal and Evaluation of the Bioactivities of Chosen Extracts. American Journal of Food Technology, 6, 1002-1020.

INVESTIGATION OF PHASE TRANSFORMATIONS IN MURZYNSKIY KAOLIN IN THE PRODUCTION OF METAKAOLIN

Tatiana Zelenyuk, Natalia Kayda, Olga Skorodumova, Tatyana Gontar, Yana Goncharenko

The metakaolin is low-fired kaolin chamotte. Due to its high activity to free lime, the metakaolin is of interest to producers of dry building concrete mixtures and refractory ones.

The aim of the work is to research the interconnection of structural order degree and phase composition changing in metakaolin during the firing process.

It has been founded that the degree of structural ordering of Murzinskiy kaolin influences the phase composition of fired metakaolin and crystallization degree of its phases as well as its adsorption activity degree.

The influence of calcination temperature on the adsorption activity value of the murzinskiy metakaolin has been researched.

It is found that the adsorption activity of methakaolin increases with decreasing the degree of ordering of kaolinite in the initial kaolin. Using the kaolin based on imperfect structure of kaolinite leads to partial destruction of layers of kaolinite during the calcination process, its transition into a amorphous aluminosilicate phase and the formation of amorphous oxides of aluminum and silicon, which when mixed with water form mainly Brensted basic centers of adsorption and, in small quantities, Ljuis positive centers.

It is established that increasing the firing temperature of the above 700°C decreases the adsorption activity of metakaolin. It is connected with passivation of the surface of the metakaolin particles due to the activation of the process of crystallization of its main phases, which leads to a decrease in the number of Brensted basic centers. The obtained results are consistent with the results of X-ray phase analysis.

Keywords: Murzinskiy kaolin, phase transformations, metakaolin, adsorption activity, the degree of ordering of kaolinite, mullitization.

References

1. Zakharov S. A., Kalachik B. S. (2007). High-active methakaolin is a modern mineral modifier of concrete systems. Building materials, 5, 2-3.
2. The chemical and mineral additions to cement. Ed by A.V. Usherov-Marshak (2005). Kharkov, Ukraine: Kolorit, 280.
3. Dvorkin L.I. (2004). The properties of cement masses containing the compositional addition for high-strength concrete production. Bulletin of the Donbass State Academy of the building and Architecture, 2(143), P.45-49.
4. Al-Akhras N.M. (2006). Durability of metakaolin to sulfate attack Chem Concr Res, 36(9), 1727-1734.

5. Dvorkin I.Y. , Lushnikova N.V., Runova R.F. (2007). The methakaolin in building solutions and concretes. Kuiv, Ukraine: KhNUBA, 216.
6. Avgustinnik A.I. (1975). Ceramics. Leningrad, USSR: Stroyizdat, 592.
7. Shulyak R.C., Primachenko V.V., Godlevskaya V.L. (1985). The investigation of Murzinskiy kaolin. Refractories, 11, 29-34.
8. Shulyak R.C., Primachenko V.V., Karyakina E.L. (1990). The investigation of hard-sintering murzinskiy kaolin. Refractories, 3, 20-25.
9. Zelenyuk T.V., Yudin A.C., Skorodumova O.B. (2011). The research of phase composition of Murzinskiy kaolin. Bulletin of the National Technical University "KPI", 59, 81-86.
10. Gunkoo V.M. (2010). Quantum-cnemical analysis of adsorption process and mechanisms of chemical reactions on solid surfaces Chemistry, Physics and Surface technology, 1(1), 5-18.

WESTE PRODUCTS OF STEEL GALVANIZING PROCESSES FOR OBTAINING TECHNOLOGY OF COLORED GLAZES (p. 45-48)

Orest Vakhula, Igor Poznyak, Ivan Solokha, Myron Pona, Zenon Borovets

The subject of this research is glass-forming compounds pegmatite-slag of thermal pover plants-waste products of galvanizing processes based on frits.

The subject of this research is colored low-melt glazes.

The objective of the work is elaboration of compounds and technology obtaining colored glazes using waste products of steel galvanizing processes.

Up-to-date methods of investigation (X-ray phase analysis, differential thermal analysis, flame photometry and optical electroscopy) have been used in this work. Peculiarities of the formation of slimes of steel parts galvanizing and their properties have been investigated. The processes of gas formation in the process of thermal treatment of slimes have been studied in the range of temperatures 293...1773 K. Regularities of crystallization of coloring crystal phases α-Fe2o3, ZnO•Fe2o3 and Feo•Fe2o3 that ensure obtaining colored glazes have been established.

Technology of obtaining low-melt glazes of brown and cherry-brown colors based on low-melt frit without adding additional ceramic pigments with firing temperature 1343...1373 K has been elaborated. It was established, that with the increase of slime content from 10 to 30 weight % in the composition of glazes the color of coating changes from brown to cherry-brown and the purity of color increases from 31 % to 47 %.

The obtained compositions of such glazes were successfully tested under the manufacturing conditions and confirmed the possibility of producing decorative oven ceramic tiles with improved decorative and maintenance properties.

Keywords: waste products galvanizing process, electrolyte, crystal phases, milling, glaze, firing.

References

1. Siniutkin, A. N., Suprunchuk, V. I., Ivaniuk, E.V., Kostoglod, O. B. (2012). Recycling of galvanizing weste / A.N. Siniutkin, // Voprosy khimii i khimicheskoy tekhnologii, 2, 175-178.
2. Bek, M.V., Pona, M.G., Borovets, Z.I., Khomiak, A.B., Solokha, I.V., Danchuk, O.B., Stoianovska, O.M., Koltyk, O.I. (1986) Non-frite glaze / M.V. Bek, // A.S. 1263683, MKI C 04 B 41/86, № 3885083.
3. Takibzeva, S.S., Nugmanova, C.K., Kulakhmetova, S.U. (1989) Apply plants-waste for obtaining low-melt glazes / S.S. Takibzeva, // Building materials on a basis of different plant-waste of Kazakhstan, Alma-Ata, 82-85.
4. Tishchenko, G.P., Moiseenko, N.U., Zhuravlyov, V.S. (1991) Recycling of plants-waste galvanizing materials / G.P. Tishchenko, / Actual problems of chemical science and technology of environment. NIItechkhim, 3, 1-84.
5. Moroz, I.I., Komskaya, M.S., Oleinikova, L.L. (1980) Reference book of porcelain-faience industry / I.I. Moroz, // B.2. – M., Liglit industry, 352.
6. Pishch, I.V., Maslennikova, G.N. (1987) Ceramic pigments / I.V. Pishch, // Minsk, High school, 132 p.
7. Kerstan, W. (1988) Keramische Glasuren Aufbau, Fargebund, Dekortechniken und Rohstoffe / W. Kerstan, // Sprechsaal, 121, 8, 636-639.
8. Wakamatsu, M., Nobuyuki, T., Shingo, I. (1990) Effect of firing atmosphere on the color of iron glazes / M. Wakamatsu, // Asashi Glass Found. Ind. Technol. 1, 56, 243-252.
9. Tumanov, S.G. (1956) Syntesis of the ceramic paints / S.G. Tumanov, // Physical-chemical basis of ceramics, M., Promstroyizdat, 237-292.
10. Bielienkiy, I.F., Riskin, I.V. (1974) Chemistry and technology of pigments. L., Chemistry, 27.

APPLICATION OF SUBACID CATIONITES FOR WATER CONDITIONING IN BAROMEMBRANE DEMINERALIZATION (p. 48-52)

Irina Makarenko, Elena Glushko, Vladimir Rysukhin, Oksana Tereshchenko

The article presents the results of studies on the stabilization treatment of water before the baromembrane demineralization. It was shown that subacid cationites in the acid form provide a complete reduction of alkalinity of water with its partial softening, and strongly acid cationites in the sodium form provide deep water softening without reducing its alkalinity. Ionites in a salt form provide effective neutralization of acidified aqueous solutions, including permiates and filtrates transferring the subacid cationites to the acid form. It was found that subacid cationites in calcium (magnesium) form are almost not regenerated by sodium chloride solutions in neutral and subacid medium. It was shown that the strongly acid cationite effectively adsorbs hardness ions with sodium ions concentration up to 143 mg-ekv/dm3, but at the same time it is effectively regenerated by 5-10% sodium chloride solutions.

Keywords: ion exchange, cationite, demineralization, nanofiltration, permiat, concentrate, regeneration

References

1. Belichenko, U.P.(1990). The closed water system chemical industry. Mosscov: Chemistry
2 Gomelya, I.N., Omelchuk ,Y.A., Radovenchik ,V.M . (2008). Evaluation of cation exchangers KU-2-8 and Aqualite R-100 FC during the softening of water in the presence of iron ions . Eco-technologies and resources, № 3, 62-65.
3. Goltvyanitskaya, E.V., Shabliy, T.A., Gomelya, N.D., Stavska, S.S. (2011). Evaluating the effectiveness of the use of weak acid cation resin Dawex MAC-3 in the cationic water softening . News of NTU "KPI" Seriya "Himichna inzheneriya, ekologiya that resursozberezhennya.", № 2 (8), 87-92
4. Gomelya, N.D. , Shabliy, T.A., Nosacheva U.V. (2004). Water conditioning systems for water resource . Environmental Technology and Resources., № 4, 55-58.
5. Shabliy, T.A., Makarenko , I.N., Goltvyanitskaya, E.V. (2010) . Development of efficient technologies for industrial water softening water consumption . Power Technologies and Resources, № 1, 53-58.
6. Risuhin, V.V., Glushko , E.V., Makarenko , I.N. (2012) . Effect of concentration of sulfuric acid cation form DOWEX-MAC-3 for the effectiveness of its regeneration . Bulletin Natsionalnorho Technical University "KPI", № 34, 137-145
7. Makarenko, I.N., Glushko , E.V., Risuhin, V.V., Malin, V.P. Application slabokyslotnoho cation Dowex MAC-3 for stabilizing treatment . Eastern European journal of advanced technology, № 3/6 (57), 16-21.
8. Method of restoring regenerative sodium-cation water softener . pat. 43183 Ukraine, MPK9 B 01 D 33/04 / Zhurovstkyy ,M.Z., Gomelya, I.M., Risuhin, V.V. Il'chenko, M.Y., Radovenchyk, V.M., Kamayev, V.S., Chernovolov, G. Y,; zayavytel

and patentoobladatel NTU "KPI". - № 200901203, appl. 16.02.2009, publ. 10.08.2009. Bull. Number 15
9. Andriyash, S.V., Gomelya, I.N., . Shabliy, T.A. (2007). Regeneration of the cation exchanger KU-2-8 when creating a low-waste technologies softening and desalination of water. Environmental Technology and Resources, № 2, 34-39. 10. Gomelya, N.D., Nosacheva , U.V. (2004). The development of available ion-exchange resins for water softening processes of resource. Environmental Technology and Resources, № 6, 51-54.

QUANTUM-CHEMICAL CALCULATION OF NMR SPECTRA OF FUNCTIONALIZED SILICA SURFACE (p. 52-56)

Yuliia Miroshnychenko, Yuriy Beznosyk, Olesia Smirnova, Yuriy Zub

On the basis of quantum-chemical calculations of NMR spectra (DFT (GIAO/B3LYP / 6-311 + + G (d, p))) of fragments of the surface of silica, which is functionalized by phosphene-oxide, nitrogen containing and thiourea groups [≡ Si (CH2) 2P (O) (OC2H5), ≡ Si (CH2) 2P (O) (OH) 2, ≡ Si (CH2) 3NH2, ≡ Si (CH2) 3NHC (S) NHC2H5], the correct assignment of resonant frequencies in the theoretical and experimental NMR spectra of the synthesized adsorbents was carried out. The theoretical analysis of the NMR spectra of the studied fragments permits to identify the causes that determine the behavior of the surface layer of modified silicas. The values of chemical shifts of shielding constants at nuclei ^{13}C ^{31}P were determined when forming hydrogen bonds between the donor and silane groups with and without water molecule.

The data of quantum-chemical calculations of fragments of surface when determining the factors that influence the position of signals in the NMR spectra are in some cases significant additional argument in favor of the existence of certain structures on the surface.

Keywords: quantum-chemical calculations, NMR spectrum, shielding constant, IR spectrum, functionalized silica surface, hydrogen bond.

References

1. Mingalyov, P.G., Lisichkin, G.V. (2006). Chemical modification of oxide surfaces with organophosphorus (V) acids and their esters. Success of chemistry, 75 (6), 604-624.
2. Zub, Yu. L. (2010). Functionalized organo-silicas: synthesis, structure, physico-chemical properties. Dis. Dr. Chem. Science. Kharkiv.
3. Zub, Yu. L., Kessler, V.G. (2008). Design of Functionalized Polysiloxane Adsorbents and their Environmental Applications. Sol-Gel Methods for Materials Processing (ARW NATO), 1 - 29.
4. Nazarchuk, H.I., Gona, Ye.I., Zub, Yu.L. (2011). Synthesis, structure and sorption properties of mesoporous silica functionalized with thiourea groups. Kyiv: Naukova Dumka.
5. Belaykov, P.A., Ananikov, V.P. (2011). Modelling of NMR spectra and signal assignment using real-time DFT / GIAO calculations. Russian Chemical Bulletin, 5, 765-771.
6. Novikov, V.V. (2009). Analysis of High-Resolution NMR Spectra. Moscow, A.N.Nesmiianova Scientific Research Center of Chemistry and Polymer Physics Institute of organometallic compounds.
7. Miroshnychenko, Yu.A., Beznosyk, Yu.O., Smirnova, O.V., Zub, Yu.L. (2012). Quantum-chemical calculations of the fragments of the silica surface functionalized with nitrogen-, phosphorus and sulfur-containing groups. Eastern-European Jounal of Enterprise Technologies, 2/14 (56), 49-50.
8. Miroshnychenko, Yu.A., Beznosyk, Yu.O., Smirnova, O.V., Zub, Yu.L., Leshchynckyi, Ye. (2011). Quantum-chemical modeling of functionalized silica surface . Research Bulletin of National Technical University of Ukraine "Kyiv Polytechnic Institute", 3, 141-145.
9. Chong, D. P. (1995). Recent Advances in Density Functional Methods. Singapure: World Sci..
10. Becke, A. D. (1993). Density-functional thermochemistry. III. The role of exact exchange. J. Chem. Phys, 98, 5648-5659.
11. Melnyk, I.V., Stoliarchuk, N.V., Dudarko, O.A., Zub, Yu.L., Dabrowski, A., Barczak, B., Alonso, B. (2010). Bridging adsorption materials of polisilseskviksan containing the remains of phosphonic acids. Physical chemistry of surface and protection materials, 46(2), 174-182.
12. Dudarko, O.A, Honcharik, V.P., Semenii, V. Ya., Zub, Yu.L. (2008). Sorption properties of polysiloxane xerogels functionalized with derivatives of phosphonic acid with respect to ions of Hg^{2+}, Nd^{3+}, Dy^{3+} and UO^{2+}. Physical chemistry of surface and protection materials, 44(2), 193-197.

DEVELOPMENT OF DECORATIVE COATINGS FOR FACIAL CERAMIC PRODUCTS (p. 56-59)

Yulia Kharybina, Oleg Pitak, Inna Pitak

Nowadays an increase of construction requires the development of building materials industry.

The objective of the study is to develop the structure of decorative coatings for facial ceramic products with high performance criteria.

The experimental studies have demonstrated the possibility to obtain glazed surfaces for ceramic products, namely, the facial tile with high micro-hardness and wear resistance, as well as with small amount of the components of charge on the basis of industrial wastes such as glass wastes (breakage of bottles and jars), granite wastes and as a dye - bauxite sludge.

The dependence of the properties of glazed ceramic coatings on the amount of bauxite sludge was determined. The optimum calcination temperature of the coatings and structure of the charge were chosen, which promote the production of glazed ceramic coatings with high performance criteria.

Keywords: glazed ceramic products, facial tile, industrial wastes, performance criteria.

References

1. Pitak, O. (2006). Colored wear-resistant coatings for ceramics based on the system ZnO–MgO–Al2O3–SiO2, using manmade materials. Ph.D. dissertation work, National Technical University "Kharkiv Polytechnic Institute".
2. Krupa, A., & Gorodov, V. (1990). Chemical engineering ceramic materials. Kiev, Vyshcha shkola, 399.
3. Beck, J. (1997). Iron-content jamming enemals based glaze waste. Ph.D. dissertation work thesis, Lviv State Polytechnic University.
4. Budnikov, P., Berezhnoy, A., Bulavin, I., Kukolev, G., Perevalov, V., Melyansky, I. (1946). Technology ceramic products: State publishing construction literature.
5. Pitak, O., Podchasova, K., & Kashuk, O. (2006). Glass colored coating. Proceedings of the 1st National Conference of Students and Young Scientists in chemistry and chemical engineering, 159.
6. Pitak, O., Kurochka, S., & Grineva, N. (2004).On the use of waste catalysts for coloring glazes. Proceedings of the 5th Ukrainian Conference of students and Young Scientists: Modern Problems of chemistry, 39.
7. Anpilov, M. (1986). Crude enemals glaze with a high content of the crystalline phase and improved physical and mechanical properties. Ph.D. dissertation work thesis, Kharkiv Polytechnic Institute.
8. Ryschenko, M., & Lisachuk, G. (1987). Improving the performance properties of ceramics. Kharkiv: HDPU, Vyshcha shkola.
9. Grin, S., Pitak, I., & Kuznetsov P. (2012). Effect of vanadium compounds on the environment. East-European Journal of enterprise technologies, Kharkiv: Technological centre, 60, 9–13.
10. Pitak,I. (2012). Fundamentals of the theory and design of rotary machine parts. East-European Journal of enterprise technologies, Kharkiv: Technological centre, 58, 14-18.

STUDY OF REDUCTION OF NICKEL (II) COMPOUNDS BY COMPLEX SOLID REDUCING AGENT (p. 59-62)

Vyacheslav Loboyko, Anatoly Butenko, Anna Yurchenko, Tatiana Dovbiy, Antonina Lavrenko

The article discusses the method of the chemical reduction, namely the use of hexamine for the reduction of compounds of nickel (II), namely, nickel (II) hydroxide. The main objective of the study is to determine the optimal process parameters (temperature and time of reduction), with the prospect of the introduction of the proposed method in the industry. The comparative analysis of currently used solid reducing agents indicates the benefit of hexamine application. The use of modern instrumental methods of analysis permits to carry out the analytical control over the completeness of reduction of Ni (OH)2. The described in this paper thermographic studies permit to obtain technologically weighty information that is important to choose the best way of the chemical reduction of compounds of nickel (II) to metallic powder. The results can be used by experts working in the field of inorganic synthesis, as well as in the field of production of metals from secondary raw materials. The established process parameters allow the optimization of this process, not only from a technological point of view, but also from the economic.

Keywords: reduction, reducing agent, hexamine, nickel (II) hydroxide; derivatography

References

1. Bulgakov N. On the nature of the catalytic action of the product in the reduction of metal oxides / N. Bulgakov, V. Boldyrev // Kinetics and Catalysis, 1973. - T.14. - № 6. From 1402-1405.
2. Bybee V. Patterns of recovery of nickel hydrogen / V. Bybee, M. Mr. Krasheninnikov, S. Filippov // Proceedings of the universities. Iron and steel, 1964. Number 1. Pp. 13-19.
3. Katayama Hidesi Recovery of nickel oxide in the liquid slag with hydrogen / Hidesi Katayama, Taguchi Says, Nobuo Tsuchiya, Okabe Kedzie // Tetsu to hagane, J. Iron and Steel Inst. Jap., 1978. V. 64. Number 11. P. 12.
4. Bajkov A. Reduction of the oxides by solid carbon / Bajkov A, Tumarev A. // Proceedings of the Academy of Sciences of the USSR. OTH, 1967. Number 1. S. 25-45.
5. Gerasimov Y. Chemical thermodynamics in nonferrous metallurgy / Y. Gerasimov, A. Krestovnikov, A. Checks. - Moscow: Metallurgizdat 1961. T 2.
6. Vanyukov A. Complex processing of copper and nickel materials / A. Vanyukov, N. Utkin. - Chelyabinsk Metallurgy, 1988. - 432.
7. Merzhanov A. // Ceram. Intern. 1995. V. 21. P. 371 /
8. Kulikov I. Thermodynamics of oxides: Right. ed. / I. Kulikov. - Moscow, Metallurgy, 1986. - 137.
9. Tiwari B.L., Snyder D.D.//J. Electrochem. Soc. 1981, V.128, № 8. p.325.
10. Murase K., Nishikawa K., Ozaki T., Machida K., Adachi G., Suda T. // Journal of Alloys and Compounds. 1998. V.264. p. 151-156.