



PROCESSES AND EQUIPMENT OF FOOD AND CHEMICAL INDUSTRIES

RESEARCH OF SALES DYNAMICS OF BODY WEIGHT REGULATION MEANS IN UKRAINE

page 4–7

The problem of overweight was revealed in the paper. In total, about 15 % of our population suffers from obesity. Obesity should be treated as a chronic disease, and like any chronic disease, it requires long-term treatment under medical supervision. Low information culture of the population and sometimes lack of doctors' attention to this problem has led to the fact that different body weight regulation means, most of which are naturally BAAs (biologically active additives) have become widespread in Ukraine recently.

With the support of a marketing group «Business-credit», market research of sale of foreign weight regulation means was conducted. It was aimed at identifying the main distribution channels of these products and giving a brief characteristic of the most common means as well.

The main reason for this study was the variety of products for weight regulation. It was tasked to identify the most popular means, conduct comparative analysis of prices for means in different places of sale, estimate the costs of purchasing a particular product in combination with its expiration date and briefly describe the most popular means. The data show that biologically active substances are the most popular weight regulation means. Over the last year, an increase in sales of foreign bioactive substances has decreased by 22,74 % while the increase in sales of domestic bioactive substances has grown by 64,17 %. The situation is caused by the difference in price: domestic biologically active substances are on average 27,38 USD cheaper than foreign.

Keywords: regulation, weight, body, body mass index, obesity, factors, medications, weight loss.

References

1. Tepaeva, A. Y., Rodyonova, T. Y. (2012). Ozhyrenye — hlobal'naia problema sovremennoho obshchestva. *Fundamental'nye yssledovaniya*, № 12, 132.
2. Savel'eva, L. V. (2007). Sovremennaiia kontseptsyia lechenyia ozhyrenyia: klynicheskyye rekomendatsyy dlia praktykuiushchykh vrachei. *Farmateka*, № 12, 41–46.
3. Lesyovskaia, E. E., Florova, N. Yu., Drozhzhyna, E. V. (2001). *Byolohycheskyye dobaivky k pyshche*. SPb.-M.: Sova. EKSMO-Press, 544.
4. Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York: International Universities Press, 34–35.
5. Weiss, J. L., Malone, F. D., Emig, D. et al. (2004). Obesity, obstetric complications and Cesarean delivery rate a population-based screening study. *American journal of obstetrics and gynecology*, 190, 1091–1097.
6. O'Brien, T. E., Ray, J. G., Chan, W. S. (2003). Maternal body mass index and the risk of preeclampsia: a systematic overview. *Epidemiology*, 14, 368–374.
7. Cedergren, M. I., Kallen, B. A. (2003). Maternal obesity and infant heart defects. *Obesity research*, 11, 1065–1071.
8. Mel'nychenko, H. A. (2006). *Ozhyrenye: etyolohyia, patohenez, klynicheskyye aspekty*. MYA, 401.
9. Harris, J. L., Bargh, J. A., Brownell, K. D. (2009). Priming effects of television food advertising on eating behaviors. *Health Psychology*, 28, 404–413.
10. Wing, R. R.; In: Wadden, T. A., Stunkard, A. J. (2002). *Behavioral weight control*. Handbook of obesity treatment. New York: Guilford Press, 301.
11. Rasmussen, K. M., Hilson, J. A., Kjolhede, C. L. (2002). Obesity as a risk factor for failure to initiate and sustain lactation. *Advances in experimental medicine and biology*, 503, 217–222.
12. Hrynevych, V. B., Sas, E. Y., Kravchuk, Yu. A., Efymov, O. Y. (2012). Abdomylnal'noe ozhyrenye: klynicheskyye aspekty problemy. *Farmateka*, № 16, 34.
13. Bodnar, P. N. (2007). *Endokrynolohyia*. Vynnytsa: Nova knyha, 344.
14. Tataranni, P. A., Ravussin, E. (2002). *Energy metabolism and obesity*. Handbook of obesity treatment. New York: Guilford Press, 42–72.

PROSPECTS OF IMPROVEMENT OF ACCELERATED BREAD TECHNOLOGIES BY USAGE OF DOGROSE AND HAWTHORN

page 8–11

In this article the analysis of main problems of baking industry connected with introduction of resource-saving technologies and reduction of quality of derivable product has been conducted; the current problems facing bread manufacturers have been determined. The objective of this research is the development of methods of complex increase of quality of products, their consumer properties, safety and nutritional value by usage of fruit phyto-additives.

In this work on the basis of analysis of chemical composition of phyto-additives the hawthorn and dogrose berries have been selected. With the usage of physicochemical, microbiological and other methods, the technological properties of powders and puree of the selected fruit phyto-additives and their water and milk whey extracts have been studied.

The results of impact of the investigated extracts on biotechnological properties of yeast and lactic acid bacteria, intensity of microbiological processes during fermentation of flour intermediate products and quality of wheat bread have been presented. The potential of reduction of technological cycle duration by 60–90 min without degradation of quality of finished products has been shown.

The recommendations of rational parameters of preparation of extracts and their usage as biostimulants for fermentative microflora and intensifiers of dough fermentation have been provided. The potential of their usage as alternative to preservatives and other food additives for extension of shelf-life and increase of microbiological stability of product during storage has been presented.

The results of research may be used on plants and bakeries as well as restaurant businesses and allow to offer the customer higher-quality products containing no compounds of chemical nature with the opportunity of reduction of technological cycle duration and production costs.

Keywords: extract, dogrose, hawthorn, microbiological processes, yeast, bread quality.

References

1. Akinfieva, I. (2008). Our daily bread. *Products & Ingredients*, 2, 24–26.
2. Dewettinck, K., Bockstaele, F. V., Kühne, B., Van de Walle, D., Courtens, T. M., Gellynck, X. (2008). Nutritional value of bread: Influence of processing, food interaction and consumer perception. *Journal of Cereal Science*, 48, 243–257.
3. Semak, B. B., Barna, M. Yu., Demkevych, L. I., Lvivska, K. A. (2011). Domestic market of medicinal herbs: problems and solutions. *Scientific bulletin of NLTU of Ukraine*, 21(1), 264–268.
4. Pengelly, A. (1999). *The Constituents of Medicinal Plants — An Introduction to the Chemistry & Therapeutics of Herbal Medicines*. Ed. 2. Sunflower Herbals, 109.
5. Pustyrskiy, I., Prokhorov, V. (2000). *The universal encyclopedia of medicinal plants*. Moscow: Knizhnyi Dom, Mahaon, 656.
6. Kirieva, T. V., Hatko, N. N. (2008). Natural additives in bread technology. *Proceedings of colleges. Food technology*, 4, 59–61.
7. Yenikeiev, R. R., Zimichev, A. V., Kashaiev, A. H. (2009). The usage of functional additives in bread baking. *Food industry*, 8, 47–49.
8. Henov, A. A., Vlasova, L. N., Pismennyi, V. V. (2005). Bread with dogrose. *The bread baking of Russia*, 6, 24.
9. Pismennyi, V. V., Sitnikova, S. I., Nurmatova, Ye. N. (2006). Bread with hawthorn. *The bread baking of Russia*, 2, 36–37.
10. Aparsheva, V. V. (2011). Powdered product made from dogrose and rowan berries in technology of bakery products. *Proceedings of colleges. Food technology*, 5–6, 59–61.

DEVELOPMENT OF EQUIPMENT FOR THE RESEARCH QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF PECTIN CONCENTRATES

page 11–14

The research paper is devoted to the new approach to the issue of technical equipment of the research base in the process of determining

of quantitative and qualitative characteristics of pectin extracts, concentrates and other pectin-containing products. The role of pectin substances in human life, as well as the current state of development of various pectin products production and problems of their further storage is described. The necessity of creating new laboratory equipment for studying of qualitative and quantitative characteristics of the obtained pectin extracts and concentrates is determined. The results of patent search of the existing laboratory equipment for studying of the process of plant raw material extraction are presented and their disadvantages are described. New laboratory equipment for producing pectin extracts from pectin-containing plant raw material and their further studying is elaborated. The device of the elaborated equipment and its operating principle is described. The elaborated equipment can be used in food, pharmaceutical and microbiological industry during laboratory studies of various carbohydrates (pectin substances, starch, fiber and other dietary fibers), lipids, vitamins and other substances which require conversion of soluble substance to solvent.

Keywords: pectin, pectin concentrates, study, equipment, process, extraction, plant raw material.

References

- Ipatova, L. G., Kochetkova, A. A., Shubina, O. G. (2004). Fiziolozicheskie i tehnologicheskie aspekty primeneniya pishhevyyh volokon. *Novye ingredienty, syr'e i dobački*, № 1, 14–17.
- Parahonskij, A. P. (2009). Jendokologija i problema pektina. *Uspehi estestvoznaniya*, № 3, 44–45.
- Ipatova, L. G. et al. (2007). Pischevyje volokna v produktah pitaniya. *Pischevaya promyshlennost*, № 5, 8–10.
- Dejnychenko, G. V., Maznyak, Z. O., Guzenko, V. V. (2012). Odezhanija pektynovykh kontsentrativ metodom ul'trafil'tratsionnoy obrobki. *Naukovi pratsi Odes'koyi natsional'noyi akademiji kharchovykh tekhnolohiy*, V. 41, T. 2, 469–473.
- Donchenko, L. V. (2000). *Tekhnolohia pektina i pektynoproduktov*. Moskva: Deli, 256.
- Golubev, V. N., Sheluhina, N. P. (1995). *Pektin: khimia, tekhnolohia, primeniya*. Moskva: RATNIEC, 373.
- Dejnychenko, G. V., Maznyak, Z. O., Guzenko, V. V. (2012). Teoreticheskie aspekty obrabotki pektynovykh jekstraktov. *Materialy Mezhdunar. nauch. prakt. konf. Aktual'nye voprosy sovremennoj nauki*. Kursk, 248–256.
- Il'ina, I. A. (2001). *Nauchnye osnovy tekhnologii modifitsirovannykh pektinov*. Krasnodar: Prosvishhenie-Jug, 312.
- Dejnychenko, G. V., Maznyak, Z. O., Guzenko, V. V. (2008). Problemy vprovadzhennya tekhnolohiy z vyrobnytsva pektynu. *Prohresy vni tekhnika ta tekhnolohiyi kharchovykh vyrobnytsva restorannoho hospodarstva i torhivli*, V. 1(7), 317–322.
- Zagoruyko, G. E., Kaplina, T. V., Nazaryan, A. R. (2007). Metody analiza i kontrolya kachestva gydkih i suhikh pektinsodergaschih koncentratov. *Vestnik problem biologii i mediciny*, V. 3, 18–23.
- Parshikova, V. I., Stepen', R. A., Demina, L. N.; Krasnojarskij gosudarstvennyj torgovo-jekonomicheskij institut. (27.01.06). Pat. 2281135 C2 Russia: B 01 D 11/02, F28 D1/053. Laboratornaja ustanovka dlja jekstrakcii rastitel'nogo syr'ja. № 2004123337/15; prior. 28.07.04.
- Afukova, N. A. (1996). *Protsessy proizvodstva polufabrikatov mnogofunktsional'nogo naznachenija iz dikorastushih plodov i jagod*. Kharkov, 276.

FEATURES OF SOLIDS REDISTRIBUTION WHEN PREPARING SAMPLES FOR ASSESSING PLANT RAW MATERIALS QUALITY

page 14–18

Based on the regulations of thermodynamics and colloid chemistry on the reversibility of plant raw materials properties relatively freezing, as well as playing a role in its identification, may be reflected in physicochemical properties of the liquid phase. The method for extracting them from plant raw materials, namely from tomato vegetables (tomatoes and peppers of different growing conditions) and wild berries (viburnum and cranberry) by applying the four-cycle operations of freezing-thawing-centrifugation, was developed. As a result of carrying out these operations, the liquid phase is formed, which is characterized by the resistance to solids redistribution and can be used as a sample in the assessment of plant raw materials quality using the methods of studying their physical properties, which will allow solving specific tasks and identifying goods in different groups.

The chemical composition of the raw materials (fresh vegetables and berries), liquid portion and marc was evaluated. In addition,

the composition of sugars, pectins, organic acids, fiber, vitamin C, as well as minerals and dyes was determined. The chemical composition of the obtained samples indicates the possibility of using them in the quality assessment for studying physical properties. Thus, the composition of minerals, sugars, organic acids will influence the electrophysical and cryoscopic properties of the formed liquid phases, dyes – the optical properties, macromolecular compounds (pectin and dyes) – the thermodynamic properties.

Keywords: sample, liquid phase, freezing-thawing-centrifugation, tomato vegetables, wild berries.

References

- Kuc, J. (2000). Development and future direction of induces systemic resistance in plants. *Crop Protection*, V. 19(8/10), 859–861.
- Benhamon, M. (1994). Induction of systemic resistance of fusarium crown and root rot in tomato plants by seed treatment with chitosan. *Phytopathology*, T. 84, № 12, 1432–1434.
- Patterson, P. (1993). Rain drains canned, frozen veggies. *Nation's Restaurant News*, T. 27, № 30, 18.
- Prytyska, N. V. (2007). *Identifikatsiya prodovolchih tovariv: teoriya i practice*. K.: KNTEU, 193.
- Potter, D. (1991). Functional foods offer products developers new openings. *Food Technology International Europe*, T. 8, 138.
- The berry bible: with 200 recipes using cultivated and wild, fresh and frozen berries. (2004). *Reed Business Information*, T. 251(11), 69.
- Hardenburg, R. E., Watada, A. E., Wang, C. Y. (1990). *The commercial storage of fruits, vegetables, and florist and nursery stocks*. Washington : USDA, 130.
- Otto, M. (2003). *Sovremeniye metody analyticheskoy khimii*. M.: Technosfera, 412.
- Sides, A., Robards, K., Helliwell, S. (2000). Developments in extraction techniques and their application to analysis of volatiles in foods. *Trends in analytical chemistry*, T. 19(5), 322–329.
- Huddleston, J. G., Willauer, H. D., Boaz, K. R., Rogers, R. D. (1998). Separation and recovery of food coloring dyes using aqueous biphasic extraction chromatographic resins. *Journal of chromatography B: analytical technologies in the biomedical and life sciences*, T. 711(1–2), 237–244.
- Chevalier, D., Le Bail, A., Ghoul, M. (2000). Freezing and ice crystals formed in a cylindrical food model: part 1. Freezing at atmospheric pressure. *Journal Of Food Engineering*, T. 46, № 4, 277–285.

INFLUENCE OF COMPOSITION MINERAL ADDITIVES ON CEMENT PROPERTIES

page 19–22

The influence of silicate-containing materials of different origin on cement properties was studied. The selected mineral additives have significant differences in both chemical and mineralogical composition.

It was found that the condition of a silicate and component admixture affects the rate of cement hardening. The presence of amorphous silica or glass in the additive slows down the cement strengthening in early hardening periods, while the introduction of heat-treated materials with a high content of thermally-activated aluminates to cement can speed up the process significantly.

In this regard, a number of additives, containing the amorphous silica cannot be used as such in the production of composite cement. Adding them to the composition of the latter causes a significant increase in the cement paste normal density that will certainly leads to significant degradation of strength properties of hardened cement paste.

The presence of a small amount of chemically inert solid minerals in the admixture material can improve the cement strength. Such materials can act as microfillers, thereby increasing the mechanical strength of samples.

Thus, when developing the composition of composite cement, it is appropriate introducing several additives that would have a positive effect either on the strength of samples in early periods of hardening or the grade strength of cement. The wastes of recycling coal mining debris are proposed to be used as mineral additives in cement production.

Keywords: cement, mineral additives (admixtures), recycling wastes, normal density, hydration, hardening, properties.

References

- Sobol, Kh. S., Markiv, T. E., Sanytsky, M. A., Koguch, G. V. (2003). Influence of active mineral admixtures on the blended cements

properties. *Visnyk Hatsionalnogo universytetu «Lvivska polytekhnikha». Chemistry, technology of substances and their use*, 488, 274–278.

2. Sanytsky, M., Sobol, Kh., Markiv, T., Bialczak, W. (2004). Composite cements for energy-saving concrete technologies. *Praca zbiorowa «Budownictwo o zoptymalizowanym potencjale energetycznym»*. Czestochowa (Poland), 373–377.
3. Zdorov, A. I. (1991). Mineral admixtures and their rational utilization. *Tsement*. Moscow (Russia), 24–27.
4. El-Hasan, T., Al-Hamaideh, H. (2012). Characterization and possible industrial application of Tripoli outcrops at Al-Karak Province. *Jordan Journal of Earth and Environmental Sciences*. Jordan, 63–66.
5. Jana, D. (2007). A new look to an old pozzolan: clinoptiolite – a promising pozzolan in concrete. *Proceedings of the twenty-ninth conference on cement microscopy*. Quebec city, PQ, Canada. Available: http://www.bearriverzeolite.com/images_new/DipayanJana.pdf.
6. Yoleva, A., Djambazov, S., Chernev, G. (2011). Influence of the pozzolanic additives trass and zeolite on cement properties. *Journal of the University of Chemical Technology and Metallurgy*. Bulgaria, 261–266.
7. LaBarca, I. K., Foley, R. D., Cramer, S. M. (2007). *Effects of ground granulated blast furnace slag in Portland cement concrete (PCC) – Expanded study. Final report*. USA. Available: <http://wisdomresearch.wi.gov/wp-content/uploads/05-01slagexpanded-fr1.pdf>.
8. Lewls, D. W. (1981). History of slag cements [online resource]. *Presented at University of Alabama Slag Cement Seminar*. USA. Available: http://www.nationalslag.org/sites/nationalslag/files/documents/nsa_181-6_history_of_slag_cements.pdf.
9. Joshi, R. C., Lohita R. P. (1997). *Fly ash in concrete: production, properties and uses*. USA, 128.
10. Frias, M., Sanchez de Rojas, M. I., Garcia, R., Jyan Valdes A., Medina, C. (2012). Effect of activated coal mining wastes on the properties of blended cement. *Cement and Concrete Composites*. USA, 678–683.
11. Miasnikova, E. A., Panasenko, A. I. Tokarchuk, V. V. Surmina, L. I. (1990). Use of basalt as an admixture during portlandcement grinding. *VNIIESM, Ekspres-obzor, ser. 1, issue 3*. Zhitomyr (Ukraine), 5–7.

MODIFICATION EFFICIENCY EVALUATION OF CERAMIC MEMBRANES

page 23–26

The main regularities of water purification from Ca²⁺ by micro-filtration ceramic membranes, in particular the influence of working pressure, duration of experiments, concentration of Ca²⁺ ions in the initial solution on reducing the content of these ions in the filtrate were investigated. As a result of experiments, ceramic membrane isolating characteristics: Ca²⁺ ion retention factor R (%) and spe-

cific productivity J_v (m³/(m²/h) of the membrane were calculated. Processes of water purification from Ca²⁺ ions were carried out at a pressure of 0,7 MPa. It was found that calcium ion retention factor has increased from 60 to 65,5 % with increasing the number of modifications from one to four. Herewith, membrane specific productivity at the end of each modification has not almost changed. Reducing the membrane specific productivity is associated with decreasing the solution density, which is the result of lowering the CaCl₂ solution temperature and raising the thickness of the dynamic membrane, formed during modification.

Theoretical and numerical processing of selectivity values, which were obtained in the course of modification, was performed. For processing the experimental results, taking into account the probability of their obtaining and experimental error, statistical methods were applied. It was concluded that the studies prove the highest efficiency of the fourth modification of the membrane since it is not covered by the determined interval. Further membrane modification is not expedient because the productivity will decrease, which will limit its use on an industrial scale.

Keywords: ceramic membrane, selectivity, retention factor, specific productivity, modification, baromembrane installation.

References

1. Dytnerskij, Ju. I. (1986). *Baromembrannyye processy. Teorija i raschet*. M.: Himija, 272.
2. Svitcov, A. A. (2006). *Vvedenie v membrannyye tehnologii*. M.: DeLi print, 208.
3. Kesting, R. (1985). *Synthetic polymeric membranes: a structural perspective*. Wiley, 348.
4. Ferry, J. (1936). Ultrafilter Membranes and Ultrafiltration. *Chem. Rev.*, 18, 373–455.
5. Tuwiner, S. (1962). *Diffusion and membrane technology*. New York: Reinhold, 421.
6. Mulder, M. (1996). *Basic Principles of Membrane Technology*. Ed. 2. Springer, 564.
7. Dul'neva, T. Ju. (2005). Ochistka vody ot krasitelej keramicheskimi membranami, modifitsirovannymi glinistymi mineralami. *Himija i tehnologija vody*, 27, 496–504.
8. Luyten, J. (2000). *Thesis 6th International Conference on inorganic membranes*. Montpellier, France, 2.
9. Van Gestel, T., Vandecasteele, C., Schaep, J. (2000). *Thesis 6th International Conference on inorganic membranes*. Montpellier, France, 107.
10. Sirenko, L. V. (2012). *Ekologija ta ohorona navkolishn'ogo seredovishha*. K.: FOP Bubon O. I., 20.

MATERIALS OF SCIENTIFIC CONFERENCE

MATHEMATICAL MODELING OF CHEMISORPTION PROCESS AT CHLORORGANIC PRODUCTIONS

page 28–30

The data on mathematical modeling of simultaneous chlorine and hydrogen chloride absorption by alkaline solutions are given in the paper. The purpose of the paper is to analyze the sanitary column operation and develop the mathematical model of exhaust gas purification from chlorine and hydrogen chloride. The exhaust gas neutralization process proceeds in countercurrent absorption columns, which are irrigated by the alkaline solution. Mathematical model of the process includes a system of differential equations of component-wise material balance. The material balance equation system describes the change in the component concentration according to the column height. The equation system is written taking into account the assumptions that the process is isothermal, proceeds in the full displacement in both phases; only hydrogen chloride and chlorine are absorbed from the gas flow and chemisorption reaction in the liquid phase runs immediately. The reaction surface in this case coincides with the interface, the reaction proceeds in the external

diffusion region. The process rate is determined only by the diffusion rate of the components from the gas flow to the reaction surface. The actual kinetics is not taken into account. The equations of the mathematical model allow to calculate the concentration profiles of the components according to the column height. Using the mathematical model of chemisorption of two gases allows to make calculations of similar columns at the design stage and the stage of production process investigation.

Keywords: chemisorption, reactive absorption, absorption, chlorine, hydrogen chloride, immediate reaction.

References

1. Sherwood, T., Pigford, R., Wilke, C. (1975). *Mass Transfer*. M.: Chemistry, 696.
2. Danckwerts, P. V. (1970). *Gas-Liquid Reaction*. M.: Chemistry, 296.
3. Astarita, G. (1967). *Mass transfer with chemical reaction*. L.: Chemistry, 224.
4. Akselrod, Y. (1989). *Gas-liquid chemisorption processes*. M.: Chemistry, 240.
5. Ramm, V. (1976). *The absorption of gases*. M.: Chemistry, 656.

6. Noeres, C., Kenig, E., Gorak, A. (2003). Modelling of reactive separation processes: reactive absorption and reactive distillation. *Chemical Engineering and Processing*, 42, 157–178.
7. Kenig, E., Schneider, R., Gorak, A. (1999). Rigorous dynamic modelling of complex reactive absorption processes. *Chem. Eng. Sci.*, 54, 5195–5203.
8. Kucka, L., Richter, J., Kenig, E. Y., Gorak, A. (2003). Determination of gas-liquid reaction kinetics with a stirred cell reactor. *Separation and Purification Technology*, 31, 163–175.
9. Kenig, E. Ya. (1995). Mass transfer-reaction coupling in two-phase multicomponent fluid systems. *Chem. Eng. Journal*, 57, 189–204.
10. Garmash, R. (2013). Chlorine and hydrogen chloride gas emissions cleaning in vinylchloride production. *Technology Audit And Production Reserves*, 5(4(13)), 8–10.
11. Bugaeva, L. N., Beznosik, Yu. A., Statjukha, G. A., Kvitka, A. A. (1996). An application of expert system to choice, simulation and development of gases purification processes. *J. Computers Chem. Engng*, 20, Suppl., 401–402.
12. Beznosyk, Yu., Boyko, T. V. (1981). Absorption of chlorine and hydrogen chloride from the flue gases in the production of chloromethanes. *Chemical engineering*, 34, 77–82.

KINETIC ACETYLATION OF HYDROXYL GROUPS OF ISOPRENE COPOLYMER AND HYDROXYETHYL METHACRYLATE

page 30–34

Using the method of kinetic acetylation (MKA) for the differentiation of the hydroxyl groups in oligomers is considered and some results of our research in this field are given in the paper. The main purpose of the research is to describe the method of acetylation of the hydroxyl groups and calculate kinetic parameters, as well as using the method for analyzing isoprene copolymer and hydroxyethyl methacrylate obtained by polymerization using hydrogen peroxide as the initiator. The reaction capacity differentiation of the hydroxyl groups is important either for obtaining polymer materials according to the reactions of the hydroxyl groups (HG), or understanding the mechanisms of polymerization. The obtained results allowed to reveal that the copolymer contains two types of hydroxyl groups, differing by the reaction capacity. More active HG are arranged at the molecules ends and introduced by hydroxyl radicals, initiating the polymerization, and less active are located in the polymer chain and introduced by the MEG molecules. It was found that a number of more active groups are below 2 per molecule, indicating that the chain is branching. The research results can be used in chemistry for studying hydroxyl oligomers to obtain polymer materials, in particular, in the preparation of polyurethanes.

Keywords: hydroxyl groups, method of kinetic acetylation, reaction capacity, oligomers.

References

1. In: Patai, S. (1993). The chemistry of hydroxyl, ether and peroxide groups. *PATAI'S Chemistry of Functional Groups*, Vol. 2. Ch. 16, 905–916.
2. Boiko, V. P., Grishchenko, V. K. (1985). Determination of hydroxyl groups in polymers. *Acta Polym.*, Vol. 36, No. 9, 459–472.
3. Atovmyan, Ye. G., Baturin, S. M., Lodygina, V. P. (1982). The study of OH-groups association in α - and α,ω -hydroxyoligobutadienes. *Vysocomolek. soedin.*, Vol. 24, No. 2, 131–134.
4. Grishchenko, V. K., Boiko, V. P. (2011). Hydrogen peroxide in the rubber chemistry. *Khim. prom. Ukraine*, No. 3, 65–79.
5. Siggia, S., Hanna, J. G. (1961). Use of Differential Reaction Rates to Analyse Mixtures of Organic Materials Containing the Same Functional Group. Application to Mixtures of Alcohols Including Mixtures of Isomeric Primary and Secondary Alcohols and to Mixtures of Aldehydes and Ketones. *Analyt. Chem.*, Vol. 33, No. 7, 896–900.
6. Hanna, G. J., Siggia, S. (1962). Primary and Secondary Hydroxyl Group Content of Propylene Glycols. *J. Polym. Sci.*, Vol. 56, No. 164, 297–304.
7. Boiko, V. P., Grishchenko, V. K., Yatsimirskaya, T. S. (1982). Reactivity of hydroxyl groups in oligobutadiene obtained by radical polymerization initiated by hydrogen peroxide. *Ukr. Khim. J.*, Vol. 48, No. 4, 415–419.
8. Ermol'chuk, L. V., Boiko, V. P., Grishchenko, V. K., Lebedev, Ye. V., Gusev, Yu. K., Zaboristov, Ye. N. (2008). The kinetics of acetylation of hydroxyl groups in oligodienes obtained by modification of non-functional rubbers by mercaptoethanol and hydrogen peroxide. *Polymer Journ.*, Vol. 30, No. 1, 76–80.
9. Boiko, V. P. (2002). The procedure of executing calculations at the preparation of sealants based on liquid rubbers through an interaction of component functional groups. *Kompositsini Polimerni Materiali*, Vol. 24, No. 2, 52–57.
10. In: Kine, B. B., Novak, R. M. (1985). Encyclopedia of Polymer Science and Technology. Vol. 1, *Acrylic and Methacrylic Esters*, 234–305.
11. Grishchenko, V. K., Boiko, V. P., Svistova, E. I., Yatsimirskaya, T. S., Valuev, V. I., Dmitrieva, T. S. (1992). Hydrogen-Peroxide-Initiated Polymerization of Isoprene in Alcohol Solutions. *J. Appl. Polym. Sci.*, Vol. 46, No. 12, 2081–2087.

CREATING A FUNCTIONAL ADDITIVE BC-P

page 34–36

Creation of the functional additive BC-P for using in veterinary is considered in the paper. Some results of our research in this field are given. The main purpose of the research is to create a functional additive in selecting the ratio between strains according to the spectrum of antagonistic activity of a number of pathogens that cause diseases in the porcine gastrointestinal tract. For this purpose, it was necessary to determine the type of relationship between the strains of lactobacilli and bifidobacteria under study, and the ability to general growth in mixed cultures using the indicators of acid formation and accumulation of viable cells of each of the component composition is tested. In this paper, the optimum ratio between the strains during co-cultivation is determined. The presented method allows creating a functional additive based on the strains of *Bifidobacterium infantis*: *B. longum* subsp. suis; *Lactobacillus acidophilus*: *L.* with maximum antagonistic effect on a number of pathogens. The research results can be used by researchers to create probiotic preparations both for people and animals, as well as to create bacterial preparations for fermented meat and dairy products.

Keywords: antagonistic activity, bifidobacteria, lactobacilli, probiotic, co-cultivation, ratio of strains, functional additive.

References

1. Fuller, R. (1989). Probiotics in man and animals. *J Appl Bacteriol*, No 66, 365–378.
2. Litvin, V., Polishhuk, V., Kucherenko, I. (2000). New probiotics for the prevention and treatment of acute gastro-intestinal diseases of young animals and birds. *Propozicija*, No 4, 70–71.
3. Bortnichuk, V. A., Sorokina, N. G., Nakonechna, M. G. (2005). To study on the history and design of probiotics and the prospect of their use in livestock. *Naukovij visnik Nacional'nogo agrarnogo universitetu*, Vip. 89, 354.
4. Dimova, M. I. (2006). Probiotic properties bakterioitsynohennoho strain *Lactobacillus plantarum* G3/3 (13). *Mikrobiologichnij zhurnal*, No 4, 47–54.
5. Shenderov, B. A., Manvelova, M. A., Stepanchuk, Ju. B., Skiba, N. Je. (1997). Probiotics and funktsionalnoe nutrition. *Antibiotiki i himioterapija*, T. 42, № 7, 30–34.
6. Antipov, V. A. (1991). Using probyotykyov in animal husbandry. *Veterinarija*, № 4, 55–58.
7. Egorov, N. S. (2004). *Fundamentals of Teaching against antibiotic*. Ed. 6. M.: MGU, 528.
8. Glushanova, N. A., Blinova, A. I., Bahaeva, V. V. (2004). Oh antahonyzme probyotycheskyh lactobacilli. *Jepidemiologija i infekcionnyye bolezni*, № 6, 37–39.
9. Ljannaja, A. M., Intizarov, M. M., Donskih, E. E. (1986). Biological and ecological characteristics of the microbes of the genus. *Bifidobacterium Bifidobakterii i ih ispol'zovanie v klinike, medicinskoj promyshlennosti i sel'skom hozjajstve*. Moskva, 32–38.
10. Bovkun, G. F., Bogdanovskaja, Zh. N., Borisenkova, A. N. (1993). Results of application of bifidobacteria cultivation of chickens. *Sb. nauchn. tr. VNIVIP*, 73–77.

11. Semchenko, A. V., Kaz'janin, A. V., Orlova, E. V., Neschisl-jae, V. A. (2007). Improving the process for the preparation of probiotic preparations. *Fundamental'nye issledovaniya*, № 12, 350.

KINEMATIC ANALYSIS OF DEVICES WITH MOVABLE WORKING BODY IN THE FORM OF FLAT SURFACE

page 37–40

Kinematic analysis of the mechatronic system of fan-type separation devices – vibropneumatic separator and vibration concentration table, which are widely used for the separation of granular materials is presented. The purpose of the analysis is to obtain dependencies in the form of the deck motion equations for determining the pole velocity of the deck and its angular velocity, as well as angular acceleration of the deck, velocity and acceleration of any point of the deck. As a result of the studies, it is found that when changing the geometric parameters of the calculation scheme, it is possible to control the shape and motion kinematics of the working body – the deck. Modeling of kinematic parameters of the deck motion allows to estimate the distribution of the amplitude values of velocities and accelerations. Under the condition of finding the separated material on the working surface, it becomes possible to predict the state of the material bed in terms of looseness, «pseudo-density» of separation into enrichment products.

In the production process cycles, known dependences allow to use them in configuring various technical models and influence technological efficiency.

Keywords: kinematic analysis, deck, motion equations, velocity, acceleration, deck pole.

References

- Bert, P. O. (1990). *Tehnologiya gravitacionnogo obogascheniya*. M.: Nedra, 574.
- In: Bratchenko, B. F. (1979). *Oborudovanie dlia obogaschenija uglja*. M.: Nedra, 336.
- Shevchenko, A. G. (2011). *Razvoitie nauchnieh processov vibracionnogo peremesheniya i razdeleniya mineralnogo sierija v gidkosti na koleblushejsija poverhnosti*. Dnepropetrovsk, 523.
- Isaev, I. N. (1962). *Kontsentratsionnie stoly*. M.: Gosgortehizdat, 100.
- Korchevskiy, A. N. (2013). Issledovanie parametrov peremescheniya naklonnoy podvizhnoy poverhnosti, ispolzuemoy dlya separatsii materialov. *Zbagachennya korisnih kopaln*, № 54(95), 69–77.
- Nazymko, O. I. et al. (2010). Simulation of the Coal and Rock Particle Interaction Kinetics During the Dry Separation. *Proceedings of XVI ICCP*. USA, 581–586.
- Korchevskiy, A. N. et al. (2013). Simulation of coal separation and dehydration processes. *Proceedings of XVII ICCP*. Turkey, 695–700.
- Korchevskiy, A. N. (2013). Primenenie suhoj separatsii dlya obogascheniya kamennyih i buryih uglje. *Proceedings of the XII national Conference with international participation of the open and underwater mining of minerals*. Bulgaria, 363–369.
- Korchevskiy, A. N. et al. (2013). Issledovanie razdeleniya othodov na kontsentratsionnom stole. *Proceedings of the XII national Conference with international participation of the open and underwater mining of minerals*. Bulgaria, 381–388.
- Pavlyish, V. N., Nazimko, E. I., Korchevskiy, A. N. et al.; In: Pavlyish, V. N., Nazimko, E. I. (2014). *Matematicheskoe modelirovanie protsessov obogascheniya poleznyih iskopaemyih*. Donetsk: VIK, 463.

INFLUENCE OF ALUMINATE ADDITIVES ON BLOATING OF GEOCEMENT COATING USED FOR FIRE PROTECTION OF WOOD

page 40–42

The influence of the aluminate additives on the bloating ability of geocement coating, designed for fire protection of wood was studied. The purpose of the research was to determine the bloating ability of geocement coating with aluminate additives, as well as during operation. To study the bloating mechanism, the volume factor of bloating was defined by the method of determining the volume of samples, which was formed at 350 °C. In this paper, the obtained results show that the addition of aluminate additives to alkaline alumi-

nosilicate composition, the bloating ability of fire-retardant coating not only suppresses but also increases. As compared to the prototype under test, the highest value of its bloating is 2,8 times less than the modified geocement coating. After 30 days of air storage, the most efficient aluminate additive – alumina 10 % was determined, the volume factor of bloating was 13,7 mm³/g. The data will allow fully investigating the fire-retardant effectiveness of geocement coating.

Keywords: bloating, fire-retardant geocement coating, aluminate additives, operation time.

References

- Zhartovs'kyi, V. M., Tsapko, Yu. V. (2006). *Profilaktyka horinnia tselulozomisykh materialiv. Teoriia ta praktyka*. K.: DP «Drukarnia MVS Ukrainy», 248.
- Huziy, S. H., Kryvenko, P. V. (2011). Zashchyta drevesyny ot horenyia heopolymernymy kompozytsiyami. *Budivel'ni materialy, vyrobny ta sanitarna tekhnika*, № 41, 56–64.
- Huziy, S. H., Kryvenko, P. V., Kravchenko, A. V. (2012). Zakhyst derevyny luzhnymy aliumosylykatnymy kompozytsiyami vid dii atmosfernykh ta vohneykh chynnykiv. *Budivel'ni materialy, vyrobny ta sanitarna tekhnika*, № 44, 52–60.
- Huziy, S. H., Kryvenko, P. V., Kravchenko, A. V. (2012). Zakhyst derevyny vid zaimystosti pokryttiamy na osnovi luzhnykh hidroaliumosylykatyv. *Budivel'ni materialy, vyrobny ta sanitarna tekhnika*, № 45, 38–43.
- Kryvenko, P. V., Pushkareva, Y. K., Sukhanevich, M. V., Guzyi, S. G. (2009). Fireproof coatings on the basis of alkaline aluminum silicate systems. *Ceramic Engineering and Science Proceedings*, 29(10), 129–142.
- Khalturynskyi, N. A., Krupkyn, V. H. (2011). O mekhanizme obrazovaniya ohnezashchytnykh vspuchyvaiushchykh pokrytyi. *Pozharovzryvobezopasnost'*, T. 20, № 10, 33–36.
- Kryvenko, P. V., Huziy, S. H. (2004). Doslidzhennia vplyvu mikro-napovniuvachiv na protsesy poro-, strukturoutvorennia i spuchennia kompozytsii v systemi «Na₂O-Al₂O₃-nSiO₂-mH₂O». *Stroytel'stvo. Materialovedenye. Mashynostroenye*, № 29, 31–36.
- Pushkar'ova, K. K., Sukhanevych, M. V., Huziy, S. H., Borysova, A. I. (2007). Yssledovanye vlianyia dobavky Fe₂O₃ na koef-fytsyent vspuchyvanyia modyfytsyrovannykh aliumosylykatnykh kompozytsiy. *Materyaly 46 mezhdunarodnyy semynar (MOK 46). Modelyrovanye v komp'uternom materiyalovedenyy*. Odessa: Astro-rynt, 47–49.
- Sukhanevych, M. V. (1997). *Neorhanichni materialy, shcho spuchuiut'sia, na osnovi luzhnykh v'iazhuchykh system*. K., 18.
- Lotov, V. A., Kutuhyn, V. A., Mytyna, N. A., Revenko, V. V. (2009). Ohnezashchytnye pokrytyia na osnove zhydkoho stekla. *Proektyrovanye y stroytel'stvo v Sybyry*, № 3, 49–50.

PROMISING EQUIPMENT FOR GREENHOUSE WASTEWATER TREATMENT

page 42–44

The article presents the experimental results of greenhouse wastewater treatment by means of cavitation. It is noted that the use of ultrasonic cleaning has drawbacks. It is found that the use of hydrodynamic cavitation for wastewater treatment is a promising direction. It is noted that in effluents with residues of phenolic compounds, treatment is improved when using oxidizing agents such as hydrogen peroxide. A design of cavitation reactor for wastewater treatment using an ultrasonic radiation was proposed. The reactor was tested in an industrial environment and showed good treatment results. It was found that at simultaneous action of hydrodynamic cavitation and UV, the germicidal effect occurs. Due to this, pathogenic organisms are destructed. The article illustrates the experimental setup and cavitation reactor.

Keywords: greenhouse wastewater, treatment, hydrodynamic cavitation, ultra-violet radiation.

References

- Shevchenko, M. A., Taran, P. N., Goncharuk, V. V. (1989). *Cleaning of the natural and waste waters from pesticides*. Leningrad: Khimiya, 184.

2. Orlov, V. A. (1989). *Ozonation water*. Moscow: Stroyizdat, 89.
3. Margulis, M. A. (1986). *Sonochemical reactions and sonoluminescence*. Moscow: Khimiya, 286.
4. Fedotkin, I. M., Guly, I. S., Shapovalyuk, N. I. (1998). *Using cavitation in the industry*. Kyiv: Arcturus-A, 133.
5. Litwinienko, A., Neko, A., Lukasik, K. (2005). *Technologiczne zastosowanie kawitacji hydrodynamicznej – doswiadczenie i perspektywy*. Lublin: Lubielskie Towarzystwo Naukowe, 154.
6. Gogate, P. R., Pandit A. B. (2005). A review and assessment of hydrodynamic cavitation as a technology for the future. *Ultrason. Sonochem.*, 12, No 1–2, 21–27.
7. Ilho, K., Yamashita, N., Tanaka, H. (2009). Performance of UV and UV/H₂O₂ process for the removal of pharmaceuticals detected in secondary effluent of a sewage treatment plant in Japan. *J. Hazardous Mater.*, 166, No 2–3, 1134–1140.
8. Nikoladze, G. I. (1987). *Natural water purification technology*. Moscow: Stroyizdat, 240.
9. Litvinenko, O. A., Neko, O. I. (1998). Phenol oxidation in cavitation reactor. *Pridniprovsky Sciences J.*, № 96(163), 26–27.
10. Lytynenko, O. A., Neko, O. I., Neko, S. O.; Ukr. State University of Food Technologies. (15.02.2001). Patent 33931 UA, MPK⁶ B01 J 19/00 *Cavitation reactor*. № 99042461; appl. 29.04.1999; Bull. № 1. Available: <http://uapatents.com/3-33931-kavitacijnij-reaktor.html>.
6. Kal'chenko, L. A., Podoljak, Ja. V. (2007). Upravlenie sistemoy kachestva uslug v gostinichnom biznese [Quality service system management in hotel business]. *Kul'tura narodov Prichernomor'ya – Peoples culture of Prichernomor'ya*, 121, 66–68.
7. Restorannyj biznes Ukrainy za 10 let [Restaurant business Ukraine 10 years ago]. (2013). *Restorator' – Restaurateur*, 1–2(100), 60–62.
8. Kulaeva, M. (2012). Recept rosta prodazh – Cross-selling! [Formula for increase in selling – Cross-selling!]. *Otel' – Hotel*, 7, 32–33.
9. Stoljarchuk, P., Susol, N., Sopil'nik, L. (2007). Ekspertno-sociologichna ocinka jakosti poslug zakladiv restorannogo gospodarstva [Expert sociological evaluation of quality restaurant service]. *Vimirjuval'na tehnika ta metrologija – Equipment engineering and metrology*, 67, 123–129.
10. Sergijko, V. F. Faktori pidvishhennja jakosti poslug v gotel'nij industrii ta ih klasifikacija [Increase quality service factors of hotel industry and classification]. Available: <http://jrn1.nau.edu.ua/index.php/IMV/article/viewFile/2972/2930>.

OBTAINING AND PROPERTIES OF STRUCTURALLY-DYED ALKYD RESIN

page 47–49

Dyed polymers are prepared by mixing a polymeric material and a dye. For uniform dyeing it is necessary to grind a dye. Some dyes have such properties as hydrophilicity and tendency of dyes to form agglomerates, which negatively affect the dyeing process, require additional equipment.

The method of structural polymer dyeing can eliminate these difficulties. The aim of our research is to study regularities of producing structurally-dyed alkyd resin, modified by oil. The scheme of obtaining the structurally-dyed resin, modified by oil can be represented as follows. Firstly, the reesterification of pentaerythritol by oil is carried out. At the second stage, azopigment is added to interesterificator. Then, we add the phthalic anhydride and glycerol and conduct the polycondensation up to the specified acid number.

The possibility of obtaining structurally-dyed alkyd resin, modified by oil was shown. Structurally-dyed alkyd resin has high pigment properties and can be used as an oligomeric dye.

Keywords: modification, azopigment, lightfastness, oligomeric dye.

References

1. Amirova, L. M., Haniev, M. M., Prokhorov, A. A., Sakhabieva, E. V.; Kazan State Technical University named after A. N. Tupoleva. (27.07.2001). *Structurally colored epoxy resin*. Pat. 2171268 Ros. Federatsiia, MPK7 C 08 L 63/00, C 08 K 13/02, C 08 K 13/02, C 08 K 3/22, C 08 K 5:18, C 09 D 163/00, G 02 B 1/00/. № 99116898/04; Appl. 03.08.1999, 3.
2. Hromov, A., Smrček, V. (2007). Staining polymers weight oligomeric dyes. *Polimernye materialy: izdeliia, oborudovanie, tekhnologii*, № 9, 16–21.
3. Patel, K. J., Patel, M. P., Patel, R. G. (2000). Synthesis and studies of coloured polyesters derived from bis-azo diols. *Indian J. Chem. Technol.*, V. 7, № 6, 307–311.
4. Patel, M. P., Modi, B. J., Patel, R. G., Patel, V. S. (1998). Studies of novel water-soluble colored polyesters containing azo moiety. *Journal of Applied Polymer Science*, № 68(12), 2041–2048. Available: doi: 10.1002/(SICI)1097-4628(19980620)68:123.0.CO;2-3.
5. Verma Bimal, Lakshmikanta. (2005). Synthesis and characterization of dye based coloured copolyesters. *Journal of the Indian Chemical Society*, Vol. 82, no 8, 718–722.
6. Wang Guojie, Wang Xiaogong. (2002). A novel hyperbranched polyester functionalized with azo chromophore: synthesis and photo-responsive properties. *Polymer Bulletin*, Vol. 49, Is. 1, 1–8. Available: doi: 10.1007/s00289-002-0073-4.
7. Chursin, V. I., Iliukhina, O. A.; Scientific and Production Association «Central Research Institute of leather and footwear industry». (27.05.1997). *A method for producing structurally colored amino resin*. Pat. 2080335 Ros. Federatsiia, MPK C 08 G 12/00, C 08 G 12/00/. Appl. 29.04.1993. Available: <http://ru-patent.info/20/80-84/2080335.html>.

METHODOLOGICAL ASPECTS OF HOTEL AND RESTAURANT PRODUCT QUALITY ASSESSMENT

page 45–47

The problem of improving the competitiveness of the hotel and restaurant industry in Ukraine is considered in the paper. The purpose of the research is to find efficient innovative ways of its provision. Theoretical methods are used. The feasibility of developing and practical implementing the dynamic system to ensure product quality at different levels of compliance is considered. For its optimal performance, it is proposed to carry out an integrated assessment of product quality, taking into account different levels of compliance. It is determined that required components must be criteria of compliance with: technical standard documents, actual consumer needs, expected needs of consumers, reaching the level of optimality and the potential of prospective development. The research results can be used by researchers and experts, working in the hotel and restaurant business. Taking into account the proposed approach to the integrated assessment of product quality in the development and practical implementation of the dynamic system to ensure product quality at different levels of compliance will promote ensuring high efficiency of innovative activities in the hotel and restaurant industry in Ukraine.

Keywords: products, services, product quality assessment, innovation, hotel and restaurant industry.

References

1. Kuchin, S. P., Sarmatic'ka, N. V. (2011). Osoblivosti ta perspektivi rozvitku sferi poslug v Ukraini [Special and prospect of development of service sector in Ukraine]. *Ekonomika ta upravlinnja nacional'nim gospodarstvom – Economy and management of national economy*, 3(15), 43–46.
2. Otchetnyj doklad na Obshhem sobranii chlenov Rossijskoj Gostinichnoj Asociacii [Statement at general meeting of Russian hotel association members]. (2012). *Otel' – Hotel*, 3, 52–55.
3. Veleva, S. A., Vele, A. I. (2012). Identifikacija osnovopologajushhogo faktora vlijanija na turistichestkij rynek Ukrainy [Basic factor identification of Ukraine tourist market influence]. *Jekonomika i upravlenie – Economy and management*, 3, 112–116.
4. Illjashenko, N. S. (2008). Viznachennja strategichnih upravlins'kih rishen' v zalezhnosti vid rivnja zadovolennja potreb tovarovirobnikov i spozhivachiv [Strategic management decisions determination depending on satisfy the requirements equal of commodity producers and consumers]. *Mehanizm reguljuvannja ekonomiki – Regulation mechanisms economy*, 4, 136–140.
5. Kac, M., Korol'chuk, K. (2013). Servis: kontrol' kachestva [Service: quality control]. *Restorator' – Restaurateur*, 4(102), 38–43.

8. Zhou Wen-fu, Mo Yue-qi, Jia De-min. (2000). Synthesis, structure and properties of light color bisphenol phenolic resin modified by oleic acid and rosin. *Linchan huaxue yu gongye*, № 1, T. 20, 57–64.
9. In: Ivanov, V. L. (2000). Polycarbonate-polysiloxanes containing the dye in the polymer chain. 2-nd Russian Kargin Symposium «Chemistry and Physics of Polymers at the beginning of the 21st century» (with international participation), 29–31 May 2000, Chernogolovka, Ch. 2, 28.
10. In: Dubenkov, A. N. (2001). The use of azo dyes in the production of polymeric materials. *Abstracts of Scientific and Technical Conference*. Novomoskovsk: Ros. khim.-tekhmol. un-t., M.: RKhTU, 248–249.
11. Maslosh, V., Alekseyeva, N., Maslosh, O. (2011). The study of principles of the production the structural-painted alkyd resin. *Eastern-European Journal Of Enterprise Technologies*, 6(6(54)), 42–45.
12. Sorokin, M., Lyalyushko, K. (1976). *Workshop on the chemistry and technology of film-forming substances*. M.: Chemistry, 264.
13. Gurvich, J., Kulik, S. (1974). *Chemistry and technology of organic dyes intermediates and chemicals for plastics*. Moscow: High School, 126–171.

ANALYSIS OF EXISTENT PROCESSES AND DEVICES OF BIOSCRUBBING GAS EMISSIONS

page 49–52

The paper analyzes the processes and devices of treatment and deodorization of air-gas emissions. The main purpose of the research is to synthesize and classify the processes, forming the basis of the biotechnological detoxification of emissions. The analysis has revealed disadvantages of the existent thermal, reagent and physico-chemical methods of treatment and deodorization of emissions. Benefits of using the biological degradation of industrial toxicants are outlined. It was shown that the methods of biological treatment of gaseous contaminants, in which toxic substances are decomposed into simple ones, are versatile, have low operating costs and do not cause secondary air contamination. The mass transfer processes, occurring during the migration of contaminants from the gas phase to the cells of bacterial associations are highlighted. The results of the experiments using different bacterial associations have shown the effectiveness and industrial applicability of the biological method of treatment from organic hydrocarbons, halogen compounds, as well as sulfur and nitrogen compounds. The research results can be applied in the development of environmentally compatible biotechnologies of treating air-gas emissions of anthropogenic origin.

Keywords: air emissions, biotechnological detoxification, bioscrubber, bioabsorber, biofilter.

References

1. Balabekov, O. S., Baltabayev, L. Sh. (1991). *Ochistka gazov v khimicheskoy promyshlennosti. Protessy i apparaty*. Moscow: Khimiya, 250.
2. Lebedeva, Ye. A. (2009). *Okhrana vozdušnogo basseyna ot vrednykh tekhnologicheskikh i ventilyatsionnykh vybrosov*. Nizhniy Novgorod: NNGASU, 196.
3. Vetoshkin, A. G. (2003). *Protessy i apparaty zashchity atmosfery ot gazovykh vybrosov*. Penza: Penz. tekhnol. in-t, 154.
4. Perchugov, G. Ya., Bobrov, O. G. (1986). *Biokhicheskiye metody gazoochistki. Promyshlennaya i sanitarnaya ochistka gazov*. Cherkassy: ONIITEKHIM, 22.
5. Utkin, I. B., Yakimov, M. M., Kozlyak, Ye. I., Rogozhin, I. S. (1989). Biologicheskiye metody ochistki vozdukh. *Applied biochemistry and microbiology*, T. 25, 723–731.
6. Ryabkin, M. V., Smirnov, V. N., Vinarov, A. Yu. (2001). Ochistka gazovozdushnogo potoka ot soedineniy fenolformaldegidnogo ryada biofiltratsiyey *Chemical and Petroleum Engineering*, № 4, 36–39.
7. Bakhareva, A. Yu., Yurchenko, V. A. (2005). Ispolzovaniye biotekhnologicheskogo metoda dlya ochistki promyshlennykh gazoobraznykh vybrosov ot H₂S, NH₃ i SO₂. *Eastern-European Journal Of Enterprise Technologies*, № 5/1(17), 95–99.
8. Smirnov, V. N., Ryabkin, M. B., Vinarov, A. Yu. (2002). Seleksiya promyshlennykh shtammov mikroorganizmov dlya biodegradatsii soedineniy fenolnogo ryada v gazovozdushnykh i vodnykh potokakh. *Biotechnology*, № 3, 40–44.
9. Krichkovska, L. V., Vaskovets, L. A., Gurenko, I. V., Shestopalov, O. V. and others; In: Krichkovska, L. V. (2014). *Proyektnyi rishennya u rozrobtci aparativ biologichnoi ochistki gazopodibnykh vikidiv*. Kharkiv: NTU «KhPI», 210.
10. Krichkovska, L. V., Shestopalov, O. V., Bakhareva, G. Yu., Slis, K. V. (2013). *Protessi ta aparati biologichnoi ochistki ta dezodoratsii gazopovitryanikh vikidiv*. Kharkiv: NTU «KhPI», 200.

SEDIMENT LAYER FORMATION AND ITS IMPACT ON REDUCING THE ULTRAFILTRATION MODULE PRODUCTIVITY

page 53–55

The theoretical studies of reducing the productivity of ultrafiltration (UF) modules, due to the formation of a highly concentrated sediment layer on the membrane surface, are given in the paper. The main purpose of the research is to justify the advantage of the tangential filtration over a dead-end when operating the UF module on an industrial scale. The UF module modes are considered and their comparison is given in the paper. An algorithm that allows demonstrating the magnitude of the possible sediment layer formation on the membrane surface in the UF module at the dead-end and tangential module operation, and its impact on reducing the module productivity, is developed and presented. The obtained results can be of practical use to compile operation modes of ultrafiltration systems. This research may be useful for design engineers, as well as for scientists, involved in research in the field of water purification by the UF method.

Keywords: membrane, ultrafiltration, module, productivity, sediment layer.

References

1. *Pryntsyp raboty enerhobloka na «PAO AMK»*. Available: <http://www.isd.com.ua/press/releases/article.html?id=1237>.
2. *Lyniya nepreryvnoho horiacheho otsynkovanyia na zavode «OOO Metally y polymery»*. Available: <http://metipol.com/proizvodstvo/tehnologii>.
3. Andryanov, A. P., Spytsov, D. V., Pervov, A. H., Yurchevskiy, E. B. (2009). Membrannyye metody ochistky poverkhnostnykh vod. *Vodospobnye y san. tekhnika*, № 7, 29–37.
4. *Vybor ratsyonal'nykh parametrov promyvkoy ustanovky membran-noi ul'trafyl'tratsyy*. Available: <http://khg.kname.edu.ua/index.php/khg/article/view/305>.
5. Dytner'skiy, Yu. Y. (1978). *Obratnyi osmos y UF*, 328.
6. Andryanov, A. P., Pervov, A. H., Yurchevskiy, E. B. (2009). Tendentsyy vodopodhotovky s pryimeneniyem membrannykh tekhnolohiy. *Materiyaly III nauchno-praktycheskoi konferentsyy «Sovremennyye tekhnolohyy vodopodhotovky y zashchity oborudovaniya ot korrozii y nakyepobrazovaniya»*, Moskva, Part 2, 148–157.
7. Poliakov, Yu. S. (2005). *Ul'tra- i mikrofil'tratsiya v polovokolonykh apparatakh s obrazovaniem osadka na poverkhnosti membran*. K., 150.
8. Tumin, A. N. (2014). Theoretical research of water flow character inside a roll ultrafiltration module. *Conference Proceedings. Contemporary Innovation Technique of the Engineering Personnel Training for the Mining and Transport Industry 2014 (CITEPTMTI'2014)*, 99–109. Available: http://okmm.nmu.org.ua/ua/2014_1/%D1%82%D1%83%D0%BC%D0%B8%D0%BD.pdf.
9. Brevnov, A. A. (2009). *Sovershenstvovanie hidrodinamicheskikh fil'trov za schet zakrutki potoka v kol'tsevoi oblasti snaruzhi fil'troelementa*. Sumy: SumDU, 166.
10. Kovalenko, V. P., Finkel'shtein, Z. L. (1991). *Smazochnyye i hidravlicheskie masla dlia uhol'noi promyshlennosti*. M.: Nedra, 294.
11. Cheban, V. H. (2010). Prakticheskii raschet fil'troelementa s hrushchobraznym profilem fil'truishchei poverkhnosti ochistitelia maloviazkikh zhidkostey. *Sbornik nauchnykh trudov DonHTU, Vyp. 31*, 115–126.
12. Farajzadeh, R. (2004). *Produced Water Re-Injection (PWRI). An Experimental Investigation into Internal Filtration and External Cake Build up*. Delft University of Technology. Available: http://geo.citg.tudelft.nl/~farajzadeh/Farajzadeh_msc_thesis.pdf
13. Al-Abduwani, F., Bedrikovetski, P., Farajzadeh, R., van den Broek, W. M. G. T., Currie, P. K. (2005). External filter cake erosion: mathematical model and experimental study. *SPE 6th European Formation Damage Conference (25–27 May 2005: Scheveningen, The*

Netherlands). Society of Petroleum Engineers. Available: <http://dx.doi.org/10.2118/94635-MS>.

DETERMINING THE AMMONIA CAPTURE EFFICIENCY IN COMBINED CONTACT DEVICE

page 56–58

The studies of ammonia absorption in the combined contact device are given in the paper. The main goal of the research is to determine the optimal operating conditions for the combined contact device (CCD), consisting of a perforated plate and regular packing. The effect of the gas velocity, spraying density, area of free section of grates and diameter of grates on the ammonia absorption rate is considered. These studies allow to determine operating modes and design parameters of CCD.

As a result, it is found that the decrease in the free section area reduces the contact step effectiveness, spraying density in the CCD has effect only to 8–10 m³/m²h. When using the packing N1, COP significantly increases depending on the ammonia concentration.

Thus, we can state that ammonia absorption efficiency in the CCD, operating in the mode of highly-turbulized foam confirms that the CCD design leads to intense flow mixing, retards the growth of the gas content and promotes the growth of the contact surface of phases and their renewal rate. This eliminates the raw gas leakage from the absorption compartment in the atmosphere.

Keywords: combined contact device (CCD), gas velocity in the column, ammonia concentration, free intersection.

References

- In: Cherevatov, V. F.; Chernivets'kii natsional'noi universitet im. Yu. Fed'kovicha (2005). Molod' u virishenni rehional'nikh ta transkordonnikh problem ekolohichnoi bezpeki. *Tezi dop. chetvertoji mizhnarodnoi naukoivoi konf., traven' 2005*. Chernivtsi: Zelena Bukovina, 325.
- Sirenko, V. I., Babenko, V. N. (2003). Sravnitel'nyi analiz konstruktivnykh osobnostei heometricheskikh parametrov rehuliarnykh nasadok dlia teplomasoobmennykh apparatov. *Vestnik Natsional'noho tekhnicheskoho universiteta «Khar'kovskii politekhnicheskii institut»*, № 11, 90–95.
- Dieter Brückner, Kammer der Technik Kommission für Umweltschutz. (1990). *Broschürenreihe Technik und Umweltschutz. Schallminderung durch rechnergestützte Konstruktion von verkehrsmitteln*. Leipzig: Dt. Verl. Fur Grundstoffind, № 38, 244.
- AHEMA 2000. *International meeting on Chemical Engineering*. Presse-Information. Available: <http://www.chema.de>.
- Kuznetsova, N. A.; IHKhTU. (2007). *Intensifikatsiia absorbtionnoi ochistki hazovykh vybrosov v apparatakh s obemnoi setchatoi pevdozhizhennoi nasadkoi*. I., 18.
- Spagnolo, D. A., Tze Tang Chuang, K. (1984). Improving sieve tray performance with knitted mesh packing. *Industrial and Engineering Chemical Process Des. and Dev*, 23(3), 561–565. Available: doi: 10.1021/i200026a026.
- Promyshlennye ustanovki Linas*. Available: <http://www.linas.ru>.
- Kliushenkova, M. I., Nazarov, V. I., Ivanov, A. E., Rudnev, V. E., Barinskii, E. A., Semenov, M. S., Alekseev, S. Yu.; Moskovskii hos. un-t inzhenernoi ekolohii. (27.12.09). *Hidrodinamicheskii pylehazoulovitel'*. Pat. Ros. Federatsii: RU 02377050 S1, MPK V 01 D 47/06. №2008136687/15; zaivl. 12.09.08. Biul. № 14, 4.
- Stankiewicz, A. I., Mouijn, J. A. (2000). Process Intensification: Transforming chemical Engineering. *Chemical Engineering Process*, 22–34.
- Filenko, O. M. (2011). *Zakonomirnosti hidrodinamichnikh ta masoobmennykh protsesiv ochishchemnia hazovykh vikidiv sodovoho virobnytstva u aparati z kombinovanymi kontaktimi pristoiami*. Kh., 153.

INVESTIGATION OF WOOD FIRE RESISTANCE MECHANISM IN MODIFYING BY IMPREGNATING AGENTS

page 58–60

Application of the modifiers for wood surface treatment is considered and some results of our research in this field are given

in the paper. The main purpose of the research is to investigate the mechanism of thermal decomposition of wood and effect of modification on the thermal degradation. The process of thermal degradation of modified wood by chromatography was studied. The qualitative and quantitative analysis of the obtained products was carried out. Coke residue in the treated samples was increased by 4 times and the amount of flammable gases was reduced, in particular for wood, treated with a mixture of ammonium phosphate and sulphate the amount of nitrogen was increased by more than 80 times, for wood treated with a mixture of sodium carbonate and boric acid, carbon dioxide was increased by 1,5 times, and for wood treated with a mixture of sodium orthoborate and boric acid – more than 10 % of flammable gases, the amount of carbon dioxide was slightly increased. The research results can be applied in the development of effective modifiers and in the determination of operational conditions of wooden structures.

Keywords: impregnation, wood, fire retardants, preservatives, degradation, modification efficiency, fire resistance.

References

- Shnal', T. (2006). *Ognestoikost' derevjanih konstruksiy*. Lviv: «Lvovskaja politehnika», 220.
- Romanenkov, I. G. (1991). *Ognezashhita stroitel'nyh konstruksij*. Moscow: Strojizdat, 320.
- Tychino, N. A. (2002). Osobnosti prakticheskogo primeneniya ogne- i biozaschitnih sredstv dlja propitki drevesini. *Pozarovzrivoopasnost' veshestv i materialov*, Vip. 6, 38–43.
- Leonovich, A. A. (1996). Khimicheskij podhod k probleme snizhenia pozarovzrivoopasnosti drevesnih materialov. *Pozarovzrivoopasnost' veshestv i materialov*, Vip. 3, 10–14.
- But, V. P. (2004). Noviy podhod k ognеbiozashite izdeliy iz cellulozii. *Pozarovzrivoopasnost'*, Vip. 5, 31–32.
- Sivenkov, A. B. (2002). Ognezashitnie pokritija na osnove modifitsirovanih polisaharidov. Chast' 3. Kharakteristiki teplovodilenija pri plamennom gorenii i teplofizicheskie svoystva. *Pozarovzrivoopasnost'*, Vip. 3, 13–19.
- Tsapko, Ju. V. (2013). Effect of surface treatment of wood on the fire resistance of wooden structures. *Eastern-European Journal Of Enterprise Technologies*, 5(5(65)), 11–14.
- GOST 30219-95. *Mezhgosudarstvennyj standart. Drevesina ogneshhishhennaja. Obshhie tekhnicheskie trebovanija. Metody ispytanij. Transportirovanie i hranenie*. (1997). Kyiv, 44.
- Bazhenov, S. V. (1999). *Sposoby i sredstva ogneshhity drevesiny: Rukovodstvo*. Moscow: Russia, VNIPO MVD, 55.
- Otkidach, D. M. (2005). *Flehmattyuvannya flammable gas environments*. Kyiv: Pozhinformtehnika, 196.

VACUUM RECTIFICATION OF SALVIA SCLAREA ESSENTIAL OIL

page 61–63

The issue of carrying out a vacuum rectification of essential oils with obtaining planned fractions of various aromatic properties was considered and some results of our studies in this research area were given in the paper.

The main purpose of the research was to develop an integrated approach to determine the parameters of vacuum rectification of essential oils with obtaining pre-planned fractions and carrying out the vacuum rectification of the essential oil under investigation according to the established parameters. Developing the integrated approach to determine the parameters of the vacuum rectification of essential oils to give pre-planned fractions was based on the fundamental laws of distillation and the component composition data of essential oils, according to which each essential oil can be conditionally divided into the sum of binary systems by key (target) components. This made it possible to plan the approximate composition of fractions and to establish a sequence of determining the parameters of the vacuum rectification of essential oil to obtain the planned fractions. This approach was used to determine the parameters of the vacuum rectification of Salvia sclarea essential oil, pre-examining its component composition by the gas chromatography. The conducted experiment allowed to adjust the

theoretically calculated parameters of the vacuum rectification, to determine the operating conditions of selecting the planned fractions and changing their aromatic properties depending on the quantity selection limits. Carrying out the vacuum rectification of *Salvia sclarea* essential oil according to the established parameters has shown the possibility of obtaining pre-planned fractions and varying the release of various aromatic properties. The research results can be used in the technology of natural aromatic flavors while creating aromatic compositions with coordinated and harmonious flavor.

Keywords: vacuum rectification, essential oils, *Salvia sclarea*, planned fractions, flavor.

References

1. Smith, J., Charter, E. (2010). *Functional Food Product Development*. New York: Wiley-Blackwell, 528.
2. Baser, K., Buchbauer, G. (2010). *Handbook of Essential Oils-science, technology and applications*. New York: CRC Press, 994.
3. Smirnov, E. V. (2008). *Pichevie aromatizatori*. Spg: Profesiya, 736.
4. Hunter, M. (2009). *Essential oils: art, agriculture, science, industry and entrepreneurship (a Focus on the Asia-Pacific region)*. New York: Nova Science, 101.
5. Hui, Y. (2010). *Handbook of fruit and vegetable flavors*. New Jersey: A John Wiley and sons, 1117.
6. Kapás, Á., András, C. D., Dobre, Gh., Vass, E., Székely, G., Stroescu, M., Lányi, S., Ábrahám, B. (2011). The kinetic of essential oil separation from fennel by microwave assisted hydrodistillation. *UPB Sci Bull Ser B 11/2011, 73(4)*, 113–120.
7. Hawthorne, S., Riekkola, M., Serenius, K., Holm, Y., Hiltunen, R., Hartonen, K. (1993). Comparison of hydrodistillation and supercritical fluid extraction for the determination of essential oils in aromatic plants. *Journal of Chromatography A 01/1993*, 297–308. Available: doi:10.1016/0021-9673(93)83017-M.
8. Marinchenko, V. O., Domaretskii, V. O., Shiyan, P. L.; In: Marinchenko, V. O. (2003). *Technologiya spirita*. Vinnitsa: Podillyay-2000, 496.
9. Kogan, V. B., Fridman, V. M., Kafarov, V. V. (1996). *Ravnovesie mekshdy cshidkosti i parom*. Leningrad: Nauka, 2, 732.
10. Rid, R. (1982). *Svoistva gazov i cshidkosti*. Moskva: Nauka, 592.