

### THE EFFECT OF CHRONOLOGICAL FACTORS ON PHYSICAL PERFORMANCE (p. 4-8)

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The paper presents the results of research of chronological factors effect on physical performance for their use in vocational guidance and occupational selection. The assessment of factors effect has been carried out based on questionnaires, analysis of information sources, physical activity experiments, physiological and statistical methods. Information concerning annual and long-term statistics of sports achievements of Ukrainian highly qualified runners and world strongest athletes was summarized. It was shown that runners achieve the best results in the first months of individual year, and the worst – in the last months. The results of experiments on endorhythm phases effect on the youth's physical performance were proposed. It was determined that macroendorhythms are the most promising for occupational selection. Tests for self-control of biorhythmological processes were designated. The obtained results allowed identifying additional endogenous effects on physical performance. They can be used for forecasting the sports achievements with lower physiological efforts.

**Keywords:** chronological factors, effect, physical performance, biorhythmological control.

#### References

1. Deryapa, N. R. (1985). Problems of Medical Biorhythmology. Moscow, USSR: Medicine, 208.
2. Dilman, V. M. (1986). The Great Biological Clock. Moscow, USSR: Znanyie, 256.
3. Doskin, V. A., Lavrenteva, N. A. (1991). Rhythms of Life. Moscow, USSR: Medicine, 176.
4. Doskin, V. A., Kuindzhi, N. N. (1989). Biological Rhythms of the Growing Organism. Moscow: Medicine, 224.
5. Yefimov, M. L. (1990). Biological Rhythms and Creativity. Alma-Ata: "Nauka", 168.
6. Stepanova, J. A. (1986). Biorhythmological Problems of Adaptation. Moscow, USSR: "Nauka", 241.
7. Tymchenko, A. N. (2012). Foundations of Biorhythmology: Textbook. Kh.: KhNU of V.N. Karazin name, 152.
8. Shaposhnikova, V. I. (1984). Personalization and Prognosis in Sport. Moscow, USSR: Physical Culture and Sports, 159.
9. Shaposhnikova, V.I. (1991). Biorhythms – Hours of Health. Moscow, USSR: Soviet Sport, 63.
10. Bulkyn, V. A., Rebrykov, V. P. (1974). Dynamics of Sports Active-ability in the Light of the Theory of Biorhythms. Theory and Practice of Physical Education, 5, 28-29.
11. Karpenko, V. I., Shaposhnikova, V. I. (1979). Studies of Individual Dynamics of the Various Indicators in Athletes. Theory of Physical Education, 8, 27-28.

### MUNICIPAL WATERS POLLUTION BY PHARMACEUTICALS AND THEIR DERIVATIVES (p. 8-11)

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Water pollution by pharmaceutical products (FP) and their derivatives is observed in many countries around the world and has a tendency to globalization. Therefore, it is necessary to conduct the researches, aimed at investigating pollution sources and determining their quantity in effluents. An alternative of instrumental measuring of concentrations of these substances in effluent and surface waters is their theoretical calculating. The paper proposes a method for calculating the concentration of the most commonly used FP, getting to effluent waters of hospitals, as well as to effluent waters formed as a result of transient treatment of patients in residential areas. The proposed approach of quantitative determination of pollutants can be used as a tool for screening and monitoring of effluent and surface

waters as well as during consideration of project and operational issues related to sanitation and water treatment.

**Keywords:** municipal effluents, pollution, pharmaceutical products, active substance, concentration of pollutant.

#### References

1. Kujawa-Roevelde, K. (2011). Training material. Pharmaceutical compounds in environment. Removal of pharmaceuticals from concentrated wastewater streams in source oriented sanitation. Sustainable Water Management in the City of the Future, 1 - 69.
2. The State Service Ukraine on Medicinal Products. The mode of access: \www/ URL: // http://diklz.gov.ua/.
3. Muthanna, T. M., Plosz, B. G. (2008). The impact of hospital sewage discharge on the assessment of environmental risk posed by priority pharmaceuticals: Hydrodynamic modeling and measurements. International Conference on Urban Drainage, Edinburgh, Scotland, UK, 1-10.
4. Suarez S., Carballa M., Omil F., Lema J.M. (2008) How are pharmaceutical and personal care products (PPCPs) removed from urban wastewaters? Reviews in Environmental Science and Bio/Technology 7, 125–138.
5. Zgorska A., Arendraczyk A., Grabinska-Sota E. (2011). Toxicity assessment of hospital wastewater by the use of a biotestbattery. Archives of environmental protection 37(3), 55 - 61.
6. Vieno N. (2007). Occurrence of pharmaceuticals in Finnish sewage Treatment plants, surface waters, and their elimination in drinking water treatment processes. Tampere University of Technology 666, 1-117.
7. Carballa M., Omil F., Lema J. M. (2008). Comparison of predicted and measured concentrations of selected pharmaceuticals, fragrances and hormones in Spanish sewage. Chemosphere 72, 1118–1123.
8. Lindqvist N., Tuhkanen T., Kronberg L. (2005). Occurrence of acidic pharmaceuticals in raw and treated sewage and in receiving waters. Water Research 39, 2219–2228.
9. Vystavna Y., Huneau F., Grynenko V., Vergeles Y., Celle – Jeanton H., Tapie N., Budzinski H., Le Coustumer P. (2012). Pharmaceuticals in rivers of two regions with contrasted socioeconomic conditions: occurrence, accumulation and comparison for Ukraine and France. Water, Air and Soil Pollution. DOI 10.1007/s11270-011-1008-1
10. Bendz D., Nicklas A. Paxeus, Timothy R. Ginn, Frank J. Loge (2005). Occurrence and fate of pharmaceutically active compounds in the environment, a case study: Hoje River in Sweden. Journal of Hazardous Materials 122, 195-204.

### MODELING OF MIGRATION OF PESTICIDES IN SOILS FROM PERMANENT SOURCES OF POLLUTION (p. 12-15)

Yaroslava Nazemtseva, Dmytro Laznenko

Despite the high toxicity and obvious risk to the environment, pesticides are still widely used worldwide in order to increase the yield. Since their use in agriculture is regulated, the sites of obsolete pesticides, which are improperly managed, cause the most danger. Pesticides are persistent, and therefore to minimize the potential harm, their pathways in the nature should be studied. In this article it was identified the factors and processes that determine the fate of persistent organic pollutants (POPs). Factors can be divided into four main groups: characteristics of pesticides; characteristics of the soil and agronomic factors (humus content, grain size, pH, density, structure, presence of vegetation); climate; the feature of the input of the chemical. The processes are: adsorption, chemical and biological transformation, and convective transfer. The migration of pesticides from permanent sources has its patterns, for instance, high concentration of pollutant change the composition microorganisms and biological degradation. Therefore, the physical model of pesticides migration was offered. Taking into consideration the importance of prevention of environmental pollution, this topic requires future thorough study.

**Keywords:** pesticides, soil, migration, adsorption, desorption, chemical detoxification, biological detoxification, metabolites.

#### References

1. Steward, D., Chisholm, D. (1971). Long term persistence of parathion in soil. *Nature*, 47, 547.
2. Stockholm Convention on Persistent Organic Pollutants (2001). Stockholm, Sweden, 179.
3. Fent, G. (1992). Lysimeterversuche zum Abbau- und Verlagerungsverhalten des herbiziden Wirkstoffes Amidosulfuron in verschiedenen Boden mit besonderer Berücksichtigung des Nachbaverhaltens unter Einbeziehung von Gewachshausuntersuchungen, 115.
4. Smetnik, A. A. (1999). Prediction of migration of pesticides in soil. *Dis. Dr. bioiencines*, Moscow, 389 p.
5. Melnikov, N. N. (1987). Pesticides. Chemistry, technology and application. Moscow, Chemistry, 712.
6. Popov, V. E. (1984). Adsorption and migration of toxic chlorinated organic compounds in soils. Leningrad, 239.
7. Afanasyeva, A.I., Gruzdev, G. S., Dmitriev, L. B. and others (1992). Handbook on Chemical Plant Protection. Moscow, Kolos, 271.
8. Gustafsson, K. (1989). Bentazon an ecotoxicological evaluation. Report from National Chemicals Inspectorate, Solna, Sweden, 178.
9. Petruk, V. H., Yavorska, O. H. (2003). Modern environmentally friendly technologies destruction of pesticides. VSTU, UNIVER-SUM – Vinnitsa, 254.
10. Wagenet, R. J., Rao, P. S. C. (1990). Modeling pesticide fate in soils. Pesticides in the Soil Environment: Processes, Impacts and Modeling. *Soil Science Society of America*, 2, 351-399.

### METHOD FOR JUSTIFICATION OF MEASURES FOR REDUCING DUSTINESS OF WORKING AREAS IN OPEN CAST MINING WORKS (p. 15-18)

Larisa Serbinova

Despite the rapid development of mining and safety equipment, the main problem is the solution of dangerous dust situation in Ukraine during the mining works. The paper first proposes using numerical modeling method for selecting measures for stabilization of the dust situation in working areas to protect the staff from granite dust during well-drilling and granite mass crushing. This method allows performing a comparative analysis of the importance of alternative protection measures taking into account technological parameters and organizational measures stipulated by regulating documents. The proposed method for numerical modeling allows determining which process or parameter for specific mining equipment may cause a dangerous dust situation in open pit. The main feature of this method is necessity to revise the weight coefficients for each set of technological process parameters and characteristics of environment. It allows the most accurate estimation of possible risks of dust pollution of the working area, the whole pit and adjacent areas, for determining specific working conditions, and respectively for taking and recommending the implementation of appropriate measures.

**Keywords:** working area, drilling equipment, mining works, granite dust, open pit.

#### References

1. Stoyetsky, V. F., Dranyshnykov, L.V., Yesipenko, A.D. (2006). Management of technical security of high-risk. Kiev: Aston, 408.
2. Alymov, V.T., Tarasova, N. P. (2005). *Tehnohennyi risk. Analysis and evaluation of*. Moscow: Academy YTSK, 118.
3. Shvyryaev, A. A., Menshikov, A. A. (2002). *Slash comments here systematicheskoho pollution in the atmosphere yssleduemom region: Methodological Workshop Problem ukazanyak*. Moscow: Izd Khymych. factor. Moscow. University Press, 41.
4. Method for determining risk and acceptable levels of safety for the declaration of high danger (2003). K.: Base, 191.
5. Serbinov, L. A., Vodyanyk, A. O., Besarab, O. M. (2011). Evaluation of contamination of working areas for granite quarry dust factor. Collection «Modern technology resursoenerhozberihayuchi mining». - Scientific and Production compilation: Kremenchug National University. Ostrogradsky. - Kremenchug: KNU., 2/2011 (8), P. 103 - 110.
6. Zaychenko, Y. P. (2006). *Operations Research: Tutorial*. K.: Publishing House «Word», 816.

7. Zaychenko, Y. P. (1979). *Exploration operations: Textbook. Handbook for students of high schools*. - 2nd ed., Rev. and add. Kiev: the Graduate School. Of the Main Izdat of, 392.
8. Orlovskyy, P. N. (1996). *Systems analysis Basic concepts, Principles, Methodology: Training. Handbook*. K. IZMN, 360.
9. Patent of Ukraine 75873, IPC B 08 B 17/00, E 21 C 37/00 Method study measures and means to normalize the working area dust during drilling in Granite Quarry / Serbinova, L. A., Vodyanyk, A. O. - applicants and patentootrymuvachi, appl. 11.09.2012, publ. 10.12.2012, Bull. Number 23.
10. Serbinova, L. A. (2012). Informational - analytical system for dust control working zone during drilling in hranitnomukar'yeri. *Journal of Technological University. Series "Tenichni science": Proc. Science. works*. - №. 3 (62), P. 137 - 141.

### EXTERNAL DIFFUSION AREA OF HEAVY METALS ADSORPTION FROM WASTEWATER (p. 19-22)

Sidorchuk Oksana, Yaroslav Gumnitsky

Sorption processes when using solid sorbents are widely used in chemical and food technologies and for environmental protection. Sorption is one of the most effective methods of industrial water purification, containing various impurities, and allows fine purification under the MAC norms. Very important, from a practical point of view, during the industrial wastewater adsorption purification is a kinetic process or adsorption rate. According to kinetic mass transfer processes, both outside diffusion and pore diffusion regions are subject to determining. In the paper, the outside diffusion region is considered. Based on experimental studies: kinetics of adsorption process of copper solution in stirrer was studied; kinetic curve of copper adsorption by clinoptilolite was obtained; mass transfer coefficients for outside diffusion region of the given process were calculated; obtained coefficient values were made according to zeolite grains size; it was found that experimental and theoretical values are the best correlated to zeolite particles with larger grains diameters. Thus, the obtained results allow asserting the efficient use of Sokirnitza clinoptilolite for water purification from Cu<sup>2+</sup> ions.

**Keywords:** kinetics, adsorption, copper, zeolite, mass transfer coefficient.

#### References

1. Arkhipova, G., Mudrak, T., Zavertana, D. (2010). Influence of the superfluous maintenance of heavy metals in potable water on an organism of the person. *NAU Announcer*, № 1, 232-235.
2. Tarasevich, J., Ovcharenko F. (1975). *Adsorption on clay minerals*. Kyiv: Science. view, 351.
3. Petrushka, I., Gumnitsky, Ya., Malovany, M. (2013). External diffusion kinetics of the adsorption of anionic red 8C dye on glauconite. *Theoretical foundations of chemical engineering*, 47 №2, 191-195.
4. Matko, S., Melnik, L. (2011). Kinetic regularities of the adsorption of pectin from apple juice. *Scientific works of NUFT*, 37/38, 156-162.
5. Galarneau, A., Di Renzo, F., Fajula, F., Vadrine, J. (2001). Zeolites and mesoporous materials at the dawn of the 21st century. *Elsevier Science, Surface Science and Catalysis*, № 135, 443.
6. Gomonay, V., Golub, N., Gomonay, P., Szekeres, K. (1997). Preventing from ingress of radionuclides, heavy metals and other dangerous mutagenic factors into human and animal organisms. *Book of Proceedings of the International Regional Seminar "Environmental Protection: Modern Studies in Ecology and Microbiology"*, № 2, 9096.
7. Vaganov, I., Majewska, I., Popovich, M. (1997). *Engineering geology*. P.1. Textbook. Vinnitsa: VNTU, 101.
8. Kuliyeva, T., Lebedeva, N., Orbuh, V., Sultanov, Ch. (2009). Natural zeolite – clinoptilolite identification. *Fizika*, №3, 43–45.
9. Breck, D.W. (1974). *Zeolite Molecular Sieves: Structure, Chemistry and Use*. New York: John Wiley & Sons, 771.
10. Vasylechko, V., Gryshchouk, G., Lebedynets, L.O., Kuz'ma, Yu., Vasylechko, L., Zakordonskiy, V. (1999). Adsorption of Copper on Transcarpathian Clinoptilolite. *Adsorp. Sci. Technol.*, 17(2), 125134.
11. Atamanyuk, V., Gumnitsky, Ya. (2013). *Scientificbases of the lauter drying of dispersible materials: monograph*. Lviv: Publishing House of Lviv Polytechnic National University, 276.
12. Gumnitsky, Ya., Sidorchuk, O. (2012). Sorption of copper ions on zeolite of different fractional composition. 2nd lecture theses of

international congress "Environmental protection. Energy saving. The balanced nature". Lviv, 155.

13. Braginsky, L., Begachev, V., Barabash, V. (1984). Interfusion in liquid environments. Leningrad: Chemistry, 336.

### ANTIOXIDANTS FROM PLANT MATERIALS IN THE TECHNOLOGY OF BEER STABILIZATION (p. 23-26)

**Lyudmila Danilova, Anatoly Meletyev, Tatiana Berezka, Tatiana Arutyunyan**

Through every stage of the brewing process, oxygen badly affects the taste and stability of the final beer. At the stage of boiling wort with hop oxygen performs two different functions. It is positive for isomerization process of  $\alpha$ -acids, and it is negative for degradation processes in iso- $\alpha$ -acids. As iso- $\alpha$ -acids are destructed analytical value of wort and beer bitterness reduces, and its nature deteriorates. Normal alcoholic fermentation happens in the absence of oxygen, and this is the cornerstone of the technological scheme of accelerated production of beer. Every researcher recognized the negative role that oxygen plays in maturation. Oxidation can be stopped or slowed down by using antioxidants which either react with generated peroxide free radicals or destroy peroxides without free radicals being generated. To prevent oxidative degradation of iso- $\alpha$ -acids, accumulation dynamics has been studied with regard to trends of accumulation of bitter substances in the hopped wort depending on the time when antioxidants from the bark of oak and peppermint leaves are added into boiling wort and hop mixture. Studies have shown that it is desirable to add antioxidants from the bark of oak and peppermint leaves in 50 minutes since after wort with hop is getting boiled, in order to prevent oxidative destruction of iso- $\alpha$ -acids. It is found that antioxidant phenolic compounds from oak bark and leaves of peppermint most effectively contribute to the coagulation of wort proteins.

**Keywords:** wort, hop, oxidation, coagulation proteins, maturation, Indicator Time Test

#### References

- Glovachek, F. (1977). Brewing. Moscow, USSR: Food industry, 623.
- Bulgakov, N. (1976). Biochemistry malt and beer. Moscow, USSR: Food industry, 358.
- Lerner, I.G., Lifshitz, D.B., Basarzhova, G. etc. (1980). Advances in technology and malt beer. Intensification of production and quality. Moscow, USSR: Food industry, 350.
- Danilova, L.A. (1997). Natural antioxidants. Food and processing industry, 3, 18-19.
- TU 18.483-98. (1998). Antioxidants of plant material and their song "Vitanok 1", "2 Vitanok." Specifications. Approved. Committee of the food industry in Ukraine 20/05/98: unlimited duration. Enacted 10.01.2000r. Kyiv. 23.
- Danilova L., Malysz O.V., Itskov F.E., Nemtseva T.L. (1997). The method of natural antioxidant obtaining: pat. 19546A. Ukraine, IPC S11V5/00. (Ukraine). № 94062330. Zayavl.30.06.94: Opubl.25.12.97: Bull. № 6, 5.
- Danilova L., Malysz O.V., Itskov F.E., Nemtseva T.L. (1997). The method of natural antioxidant obtaining: pat.19547A. Ukraine, IPC S11V5/00. (Ukraine). № 94062331. Zayavl.30.06.94: Opubl.25.12.97: Bull. № 6, 5.
- Danilova, L.A., Domarecki, V.A., Rybak L.I., Nemtseva T. L. (2002). Effect of antioxidants from plant material for oxidation of the hop resins components. Vestnik of NTU «KPI». 9, v.2, 21-24.
- Lyashenko, N. I. (2002). Biochemistry of hops and hop products. Zhitomir, Ukraine: "Polesye", 388.
- Danilova, L.A., Domareckii, V.A., Hambartsumyan, G. A. (2002). Effect of antioxidants from plant material on the processes of coagulation proteins in the wort. Food and processing industry. 12, 15-16

### STUDY OF CAPACITY OF RADISH ROOTS TO ACCUMULATE NITRATES AND PESTICIDES (p. 27-30)

**Antonina Dubinina, Galina Stlyutina, Oksana Gapontseva**

Because of continuous and rapid development of agriculture, chemical and other industries, which use chemicals (including toxic and potentially dangerous), achieving a balance between the expansion of the use of chemicals and reduction of their negative effects on humans and the environment is becoming a matter of great concern.

The paper presents the first research of nitrate and pesticide contents in various sorts of radish and parts of roots using standard techniques. The studies of radish roots suggest that the samples Daikon «White Fang» and «Marhelanska» are more likely to accumulate nitrates as compared to the «Black Winter Skvyrska» and «Heart of Dragon». Experimental data on the localization of nitrate in radish roots show that the most of nitrates is accumulated in non-stiffened parenchyma (storing tissue) that exceeds the maximum allowable concentration, cambium accumulates less nitrate, periderm (investing tissue) has the minimum concentration of nitrates. It was also determined that pesticide content in all experimental samples does not exceed the MAC 0.05 mg/kg.

**Keywords:** sorts of radish, nitrates, pesticides

#### References

- Dubinina, A. A., Maljuk, L. P., Seljutina, G. A., Shaporova, T. M., Kononenko, L. V. (2005). Tovaroznavchi aspekti pidvishhennja bezpeki harchovih produktiv: Monografija. K. : Profesional, 176 p.
- Amelin, A. A., Amelina, S. E., Sokolov, O. A. (1996). Nakoplenie nitratov rastenijami pod dejstviem kompleksa vneshnih i vnutrennih faktorov. Agrohimiya, № 12, 13-16.
- Maynard, D. N., Barker, A. V., Minotti, P. L., Perk, N. H. (2006). Nitrate accumulation in vegetables. Ad Agron, Vol. 28, 71-118.
- Berry, C.G. (1998). Pesticides. Human Toxicology, 7, № 5, 433-436.
- Toxicological aspects of food Safety. (1993). Food Chemistry, № 11, 339-346.
- Cancer risk of pesticides in agricultural workers. (1998). F. Amer. Med. Ass., 260, № 7, 959-966.
- Golubae, V. N., Sokolov, V. A., Nestrueva, E. G., Gunar, E. V. (1992). Raspreделение nitratov v syr'e i v produktah ego pererabotki. Pishhevaja promyshlennost', № 9, 23-25.
- Dubinina, A.A., Shaporova, T.N., Prokudina, V.E., Tomashevskaja, R.Ja. (1998). Vlijanie razlichnyh faktorov na sodержание nitratov v morkvi. Progresivni resursozberigajuchi tehnologii ta ih ekonomichna obruntovanist' u pidpriemstvah harchuvannya. Ekonomichni problemi torgovli: Zb. nauk. pr. Harkiv: HDATOH, Ch. 1, 241-244.
- Dubinina, A. A., Penkina, N. M., Bjelajeva, L. M. (2007). Doslidzhennja toksichnih rehovin ta lokalizacija ih u stolovomu burjaku. Tovari i rinki, 146-152.
- Dubinina, A.A., Seljutina, G.A., Bilous, V.I. (2009). Vznachennja zalishkiv fosfororganichnih pesticidiv ta sintetichnih piretroidiv v ogirkah. Visnik Harkivs'kogo nacional'nogo universitetu sil'skogo gospodarstva im. P.Vasilenka. Harkiv.
- Zelenin, V. M. (1990). Dinamika sodержaniya nitratov. Himizacija sel'skogo hozjajstva, № 5, 59-60.
- Jezzau, K.; In: Tahtadzhjana, A.L. (1980). Anatomija semennyh rastenij. M.: Mir. T. 2, 441-446.

### METHOD OF PRODUCTION OF FROZEN SEMI-FINISHED PRODUCTS ON BASED ON CRANBERRY AND VIBURNUM (p. 31-33)

**Dmitriy Odarchenko, Nikolay Odarchenko, Andriy Kudryashov, Elena Sussil**

Efficient processing and selling of frozen food products by expanding the assortment of products with berries is of current importance for both domestic and foreign food markets.

Thus, the work was aimed to develop a new method of production of the frozen berry semi-finished products and justification of its main features and benefits. The objects of the study were fresh American cranberry and cranberry high gathered in Rovno and Kharkov regions.

A new method of processing of cranberry and cranberry high was proposed and described. It involves the separation of crushed berries into two phases by cyclic freezing and centrifugation.

Thus, the principal method of getting the frozen stuff out of processed American cranberry and cranberry high provides a uniform plasma and cake that does not fall into phases over time and have a high amount of biologically active substances when defrosting. The obtained semi-finished products have new functional and technological properties and marketable features. Furthermore, the proposed method allows the full use of a berry feedstock, thus almost doubling the functionality of feedstock base for the food industry enterprises.

**Keywords:** centrifugation, freezing, plasma, solid phase, American cranberry, cranberry high.

#### References

- Orlova, N.Ya. (2005) Frozen vegetable products: problems of assortment and quality formation. Kyiv, Ukraine, 336.
- The berry bible: with 200 recipes using cultivated and wild, fresh and frozen berries (2004). Reed Business Information, 251(11), 69.
- Pavluk, R. Yu., Dibrivska, N.V. (2006) Comprehensive research in the development of technologies of functional pasty additives with wild berries. Proceedings of the National Technical University «KhPI»: Coll. Science. works / Theme Issue «Chemistry, Chemical Engineering and Environment», NTU «KhPI», 25, 154–159.
- Dibrivska, N.V. (2009) Technology of functional semi-finished supplements from berries using processing in alternating electromagnetic field. Kharkiv, Ukraine.
- Lukanin, O.S., Khomuch, G.P., Tkach, N.I., Kyrlychenko, M.V. (2009) Method of extraction of coloring substances during production of fruit and berry juices, Ukraine, 2.
- Khomuch G.P., Tkach, N.I. (2009) Use wild raw materials to provision food products with biologically active components. Poltava, Ukraine, 159.
- Oomah, B.D., Ladet S., Godfrey D.V., Liang J., B. Girard Stephanie L., Godfrey D.V., Jun, L., Girard B. (2000) Characteristics of raspberry (*Rubus idaeus* L.) seed oil. Food Chem, 69(2), 187-193.
- Parry, J., Yu L. (2004) Fatty acid content and antioxidant properties of cold-pressed black raspberry seed oil and meal. J. Food Science, 69(3), 189-193.
- Lenartowios, W. E. al. (1980) The suitability of cultivars of raspberries for freezing 1. Quality assessment of raspberries of nine cultivars and two crosse. Fruit. 30. Rep. Skierniowice, 7(3), 125-134.
- Chesman, A. (1999) Garden-fresh berries all year organic gardening. Rodale Inc., 46(4), 28-31.
- Canned and frozen fruit provide winter nutrition usa today magazine (2002). Society for the Advancement of Education, 131(2689), 5.
- Pilat, T.L., Ivanov, A.A. (2002) Biologically active food supplements (theory, production, application). Moscow: Avalon, 710.
- Zimbalista, N.V., Davidenko, N.V. (2008) Condition of actual nutrition of the population and disease, which is caused by alimentary. Problems of nutrition, № 1-2, 32-35.
- Bankovska, N.V. (2008). Hygienic assessment of the actual nutritional of the adult population in Ukraine and scientific justification ways of its optimization. Kiev, National medical university Bogomolza O.O., author. dis .... Candidate. Med. Sciences , 26 C.
- Ukrainets, A.I., Simahina G.O. (2009). Technology of health food products. Kiev:: NUFT, 310.
- Zverev, S.V., Zvereva N.S. (2006) Functional cereal products. Moscow: DeLee print, 119;
- Sirohman, I.V., Lozova, T.M. (2006). The quality and safety of cereals and flour products. Kiev: Centr navchalnoi literatury, 384;
- Mardar, M.R., Kordzaya, N.R. (2012) Assessment of the competitiveness of bread made from the whole wheat grain with inclusion of root crops. Food science and technology, № 1 (18), 111 – 113
- Lenert, S.O., (2011). Formation of quality of vegetables and cheese curd paste with increased biological value. Kiev, KNTEU, dis .... Candidate. tehn. Sciences, 154.
- Barabash, O.U., Schram, S.G., Gutirya O.D. (2003). Edible root crops. Kiev: Vishcha wkola., 85.

### SCIENTIFIC BASIS OF FOODS QUALITY FORMATION DURING FREEZING (p. 40-42)

Andriy Odarchenko

Current conditions of food products market require expanding the range of frozen semi-finished products in particular. However, manufacturers face the problem of the maximum preservation of frozen foods original properties and nutritional value. The paper considers the issues of improving of scientific knowledge about the foods quality formation during preservation by freezing, which will help to achieve a minimum area of temperature kinetics hysteresis, i.e. to achieve thermal reversibility of freezing-unfreezing processes. For this purpose, it was proposed to use various methods of products technological processing before freezing and to control its Mcw parameter which characterizes the proportion of the mass of dry substances and moles of unfrozen water. On the example of red beet and fresh berries which were processed before freezing, the system of their quality evaluation was developed. Conducting a set of researches is promising for compiling similar systems for the assortment of frozen products and some of its types.

**Keywords:** freezing, cold storage, product quality, thermal reversibility, quality evaluation system.

#### References

### MEDICAL AND BIOLOGICAL ESTIMATION OF BREAD MADE FROM A WHOLE WHEAT GRAIN WITH INCLUSION OF ROOT CROPS (p. 34-39)

Marina Mardar, Natela Kordzaia

Modern assortment of bakery products in Ukraine is formed mainly by the traditional grades of bread and rather limited in phylyactic one.

One of the trends of expansion of assortment is production of bread made from a whole wheat grain, which is characterized by a high content of many essential nutrients: protein, vitamins, minerals, dietary fiber, and others.

The considerable content of fiber and coarse-fibered structure, make the bread made from a whole wheat grain an irritant for sensitive gastric mucosa and it may be the cause of the appearance and development of erosions and ulcers, and therefore it should be cautiously used to people with gastrointestinal disease

To eliminate restrictions of consumption of such bread to certain categories of consumers, and to improve its organoleptic properties it is reasonable to enrich it with a various additives by the use of natural raw materials, such as white root crops - celery, parsley and parsnips

The objective of the work was to carry out medical and biological researches of bread made from a whole wheat grain with inclusion of root crops and to establish possibilities of their preventive use. A positive effect of root crops on the antioxidant activity of bread made from a whole wheat grain, reduction of the ulcerogenic effect and improvement the assimilability by the human body was established in the work. A new grades of bread made from a whole wheat grain with inclusion of root crops can be recommend, both in mass and preventive nutrition.

**Keywords:** food, medical and biological estimation, bread made from a whole wheat grain, root crops.

#### References

- Doronin, A.F., Ipatova L.G., Kochetkova A.A., etc. (2009). Functional foods. Introduction to technology. Moscow: DeLee print, 288.
- Almashy, E., Erdeli, L., Sharey, T. (1981) Rapid freezing of food products. Moscow, Russian Federation : Light and food industry, 406.
- Orlova, N.Y. (1992) Texture and water-holding capacity of frozen fruit. Food industry, 1, 24-25.
- Rutskiy, A.V. (1991) Refrigeration technology processing and storage of food products. Mynsk : High school, 197.
- Dotsenko, N., Krotov, E., Brovchenko, A. (1997) Cryoprotection in frozen quince. Food and processing industry, 12, 24-25.
- Orlova, N.Y., Belinska, S.O., Kameneva, N.V. (2010) Biological value of new semi-frozen vegetables for healthy nutrition. The 17th IGWT Symposium and 2010 international conference of commerce. Romania, Buharest.
- Orlova, N.Y., Belinska, S.O., Kameneva, N.V. (2009) Quality and safety of multikomponent frozen vegetable convenience foods. The 10th international commodity science. Current trends in commodity science. Poznan, Poland.
- Freezing process improves food quality (1990) J.Food Eng.Int., 15(2), 60.
- Wells, J.H., Jingh, R.P. (1985) A graphical interpretation of time-temperature related quality changes in frozen food. Winter Meet. Amer. Joc. Agr. Eng., 65(02), 1-22.
- Fennema, O. (1997) Cryogenic freezing of foods. Cryog. Eng. Conf. Boulder Co., 8, 41-46.
- Gray, A.P. (1968) Effect of freezing process on product properties.

**FEATURES OF PIGMENT COMPLEX OF RED BEET AND PATTERNS OF ITS COLOR CHANGES** (p. 43-47)

Antonina Dubinina, Natalia Penkina, Natalia Cherevychna, Viktoria Olhovska

Red beet contains many biologically active substances, including such anthocyanins as betaine and betanin, which provide medical properties, and has a high content of catechins, flavonol glycosides, vitamins and minerals. Quantitative analysis of identified phenolic compounds indicates the varietal effect. Varietal incision contains from 218,4 • 10<sup>-3</sup>% (Single sprout) to 607,8•3% (Crimson) of anthocyanins. Along with this, the content of betaine is between 19.7% (Delicious) to 42.9% (Bordeaux Kharkov) of the total content of anthocyanins, and betanin - from 57.1% (Bordeaux Kharkov) to 80.3% (Delicious). Varietal effect on the content in red beet of such low phenolic compounds as catechins (17.4 - 31.1%), flavonol glycosides (66.3 - 84.7%) and in some varieties of oxycinnamic acids (3.3 - 13,0%) is also noticeable. Taking into account the achievements of other scientists, which state the lability of anthocyanins and dependence of their changes from the heat treatment duration, pH and other factors, as well as achieving the pigment stabilization by various protectors, we selected the following parameters of beet treatment: heat treatment (cooking) - 20 minutes; pH - 3.6; Melissa concentration in solution - 1%; size of beet slices - 15 mm. This method allows the preservation of 91 - 95% of beet pigment complex, and color features of the treated sample coincide with control features.

Keywords: red beet, phenolic compounds, pigment complex, anthocyanins.

**References**

1. Pavljuk, R. Ju., Janickij, V. V., Krjachko, T. V. and others; Har'k. gos. un-t pit. i torgovli; Departament pishh. prom-ti Min-va agrar. polit. Ukrainy. (2008). *Novye tehnologii antocianovyh dobavok* (Novye tehnologii konservirovaniya). Har'kov; Kiev, 261 p.
2. Upir, L. V., Koval'ov, V. M. (2001). *Doslidzhennja biologichno aktivnih rehovin burjaka zvizhajnogo. Fiziologichno aktivni rehovini*, № 2(32).
3. Shuljak, V. A., Dobroskok, L. P., Boluhova, M. E. (2001). *Tehnologicheskie aspekty vlijanija razlichnyh dobavok na sohrannost' krasjashhijh pigmentov svekly. Pishhevaia tehnologija*, № 4.
4. Tanchev, S. S. (2000). *Antocyanin v plodah i ovoshhah*. M.: Pishhevaia prom-t', 340 p.
5. Petrushevskij, V. V., Gladkih, E. E., Vinokurova, E. V. and others. (2002). *Biologicheski aktivnye veshhestva pishhevijh produktov*. K. : Urozhaj, 192 p.
6. Kolesnik, A. A., Afanas'eva, V. S. (2003). *Ustojchivost' pigmentov stolovoj svekly k nagrevaniju i oksileniju kislorodom vozduha. Tovarovedenie pishhevijh produktov*, Vyp. 2, 3-12.
7. Bezusov, A. T., Telezhenko, L. M., Burdo, A. K. (2009). *Shljahi stabilizacii kol'oru stolovijh burjakiv. Obladnannja ta tehnologija harchovijh virobnictv*, 327-333.
8. Ivanova, R. A. (2007). *Vlijanie stepeni koncentracii i temperatury hranenija svekol'nogo soka na sohrannost' betacianinov*. *Nac. in-t farmacii Respubliki Moldova : nauchn. trudy mezhdunar. nauch. - prakt. konf.* Odessa, Ch. 2, 117-119.
9. Zherebin, Ju. L., Kapustina, V. V. (2009). *Betalainovyie pigmenty stolovoj svekly*. K., 32 p.
10. Uspenskaja, R. N., Li, S. I. (1999). *Vlijanie rezhima teplovoj obrabotki na izmenenie krasjashhijh veshhestv stolovoj svekly. Voprosy tehnologii proizvodstva produkcii obshhestvennogo pitaniya*, 129-141.

**THEORETICAL AND PRACTICAL BACKGROUND OF REGULATING SALT SYSTEM OF RAW MILK PRODUCTS** (p. 47-53)

Raisa Plotnikova, Nataliya Grynchenko, Oksana Moroz, Pavlo Pyvovarov

The paper discusses the possibility of regulation of salt composition in milk for changing its functional and technological properties. The objective of research is identifying the theoretical background and experimental determining the parameters controlling the salt composition in raw milk products using natural complexing agent - sodium alginate. For this purpose, the content of calcium and its change in the process of demineralization, average diameter of ca-

sein micelles and the chain-length distribution were studied. The obtained results indicate the possibility of regulating the salt composition in milk by demineralization with sodium alginate, which is accompanied by increased acid and thermal stability of raw milk products. The presented materials are the basis for development and introduction of technologies of new food products, which composition, using raw milk and fruit products, is provided with colloidal stability that can be successfully applied in the food industry. Using the obtained results allows regulating functional and technological properties of raw milk products.

Keywords: salt composition in milk, complexing agent, sodium alginate, demineralization.

**References**

1. Gorbatova, K. K. (1993). *Chemistry and physics of milk proteins*. Moscow, Russia: Kolos, 192.
2. Fetisov, E.A. (1991). *Membrane and molecular sieve methods of milk processing* Moscow, USSR: Agropromizdat, 272.
3. Deynichenko, G.V. (1997) *Scientific rationale and development of technologies foodstuffs Increased values of food based on low-fat raw milk*. Kharkov, Ukraine: Kharkiv State Academy of technology and organization food, 33.
4. Didukh, N.A. (2008). *Scientific basis for development dairy technology functionality*. - Odessa, Ukraine : Odessa National Academy of Food Technologies, 37.
5. Tepel, A. (2012). *Chemistry and physics of milk*. Saint Petersburg, Russia: Profession, 824.
6. Sokolova, L.I. (1975) *Application of ion exchange processes for improving the thermal stability of milk*. Moscow, USSR: Moscow Technological Institute of Meat and Dairy Industry, 21.
7. Marianthi, F., Mike J., L., Alistair S., G., Hilton, D. (2009). *The effect of free Ca<sup>2+</sup> on the heat stability and other characteristics of low-heat skim milk powder*. *Int. Dairy J.* 19 (6-7), 386-392.
8. Singh, H. (2004). *Heat stability of milk*. *Int. J. of Dairy Technology*, 57, 111-119.
9. Alekseeva, N., U. (1986). *The composition and properties of milk as a raw material for dairy industry*. Moscow, USSR: Agropromizdat, 239.
10. Zaharova, L.V. (1982). *Methods for studying microbial polysaccharides*. Kiev, USSR. Naykova dymka, 262.

**BIOTECHNOLOGY OF FERMENTED MILK DRINKS USING BUTTERMILK AND ADDITIVES OF SPICY VEGETABLES** (p. 53-57)

Raisa Pavlyuk, Viktoriya Pogarskaya, Andriy Khomenko, Katerina Kostrova

The work deals with developing the biotechnology for production of functional fermented milk drinks with buttermilk, fortified with natural spicy and flavor additives of spicy vegetables and extracts from non-traditional medical plant materials, which contain a great number of biologically active substances. Innovative technologies were developed using new natural spicy and flavor additives in the form of quick-frozen nanostructured puree of horseradish, celery, ginger and garlic, which have essentially new consumer properties, namely, high amounts of biologically active substances in a free state (1,3...2,2 times more than in fresh feedstock). Quick-frozen nanostructured puree of spicy vegetables were used for fortifier of new types of fermented milk drinks with essential oils, phenolic compounds, flavor substances, vitamins and other biologically active substances. As a basis for production of new fermented milk drinks the buttermilk was used, obtained from production of sweet butter. The amino acid score calculation revealed that the buttermilk protein is complete in its structure, with the exception of threonine. And with such amino acids as tryptophan, lysine, leucine, valine and the total amount of methionine and cysteine, phenylalanine and tyrosine the buttermilk protein exceeds perfect protein. As a result of experimental studies biotechnologies and formulations of functional fermented milk drinks were developed, which differ in doses of nanostructured additives from spicy vegetables and extracts from non-traditional medical spicy and flavor plant materials. It is shown that new types of fermented drinks exceed domestic analogues by their chemical composition and meet the standards of the best foreign analogues.

Keywords: biotechnology, functional fermented milk drinks, buttermilk, spicy vegetables, nanostructured puree.

## References

1. Pavljuk, R. (2003). The new generation of dairy products for boosting immunity. Collection of Scientific Papers KSUFTT, Part 1, 93-99.
2. Pavljuk, R. Development of technology for canned of vitamins phytoadditives and their use in food preventative of action. (1996). Dissertation of Doctor of Technical Sciences, 446.
3. Pogars'ka, V. The scientific substantiation of technology carotenoid and chlorophyll-containing finely dispersed of herbal supplements. (2012). Dissertation of Doctor of Technical Sciences, 472.
4. Pavljuk, R., Pogars'ka, V., Berestova, A. (2010). The innovative technology of functional tonic drinks and dressings with milk whey and dressings with milk whey and nanostructured vegetable puree. Collection of Scientific Papers ONAFT, T. 2, Vyp. 38, 239-244.
5. Pogarskaja, V., Cherevko, A., Pavljuk, R. (2007). The new technology of functional health products : monograph. 262.
6. Pavljuk, R., Nakonechna, Ju., Khomenko, A. (2011). The innovative technology of sauces-dressings for health food using a additives of spicy vegetables and secondary raw milk. Collection of Scientific Papers KSUFTT, 26-35.
7. Hramcov, A., Vasilisin, S. (2003). Industrial processing of secondary raw materials, 100.
8. Khomenko, A., Nakonechna, Ju., Pavljuk, R. (2013). Biotechnology of fermented drinks on the basis of buttermilk that use nanostructured additives from spicy vegetables. The economy and technologies in the innovative development of the society of the XXI century, Saint Petersburg, 127-130.
9. Pavljuk, R., Nakonechna, Ju., Khomenko, A., Kostrova, K. (2011). New directions of use buttermilk in the health food. Abstracts of all-Ukrainian scientific-practical conference KSUFTT, Part 1, 157.
10. Pavljuk, R. (2012). Innovative cryogenic technology for finely dispersed spicy-aromatic additives with a record containing BAS. Herald Kharkiv Petro Vasylenko National Technical University of Agrikulture, 244-250.

## INNOVATIVE TECHNOLOGIES OF VITAMIN FRUIT-BERRY ICE-CREAM PRODUCTION USING FROZEN FINE-DISPERSED ADDITIVES MADE OF PLANT RAW MATERIALS (p. 57-62)

Raisa Pavlyuk, Viktoriya Pogarskaya, Adelina Berestovaya

The objective of the paper is the scientific substantiation of technologies for producing new kinds of fruit-berry ice-cream and fine-dispersed additives using a cryogenic "shock" freezing and low-temperature grinding for producing healthy products with high content of BAS. In the paper the quality of frozen fine-dispersed additives made by the innovative technology in the form of nanostructured puree was compared with feedstock in regard to BAS content. It is shown, that under conditions of feedstock freezing and low-temperature grinding, accompanied by cryogenic destruction and mechanical activation processes, BAS is more fully extracted from a biopolymer-bound into a free state. The increase rate of BAS extraction depends on its kind and varies from 1.6 to 2.9 times with respect to fresh feedstock. Technology, technological scheme and three formulations of new fruit-berry ice-cream ("Vitaminchik", "Limonchik", "Tropik") were developed, with their quality analysis

in respect to BAS content. It is shown that new healthy fruit-berry ice-cream is better than the native analogues by its chemical composition and competes with the best foreign analogues, as it contains a great amount of BAS: vitamin C, phenol compounds, tanning substances, organic acids, pectin and mineral substances. Thus, 100 g of the fruit-berry ice-cream "Vitaminchik" contains the daily norm of vitamin C, "Limonchik" and "Tropik" have half of the daily norm of this vitamin. Moreover, new kinds of ice-cream have a significant content of phenol compounds, tanning, pectin and mineral substances, etc. The quality of IR spectrums of new kinds of ice-cream was compared to their analogue ("Snihovyyk" fruit-berry ice-cream, "Khladoprom" PrJSC). The final result of the work is the development of the Scientific Research Project on nanostructured puree and new kinds of fruit-berry ice-cream. Furthermore, new kinds of ice-cream have passed degustation and approbation in production environment at Kharkov enterprises ("Khladoprom" PrJSC, "Polus LTD" SUIS LLC).

**Keywords:** innovative technology, low-temperature treatment, fruit-berry ice-cream, nanostructured puree, cryogenic destruction, mechanical activation.

## Referenses

1. Pavljuk, R. (2003). The new generation of dairy products for increasing immunity. Advanced energy saving technologies and economic justification in food service. The economic problems of trade, Ch. 1 (2), 93-99.
2. Pavljuk, R. (1996). Development of technology for preserved vitamin phytonutrients and their uses in food preventative action. Ph.D. thesis, 446.
3. Pogarskaya, V. (2012). The scientific substantiation of technology carotenoid and chlorophyll-containing finely dispersed of herbal supplements. Ph.D. thesis, 472.
4. Pogarskaya, V., Cherevko, A., Pavljuk, R. (2007). New technology of functional health products. (New in preserving technology). Monograph. Kharkov, Ukraine, 262.
5. FAO/WHO. (1992). Nutrition 21. Global problems. International Conference on Nutrition, 3.
6. Pavljuk, R., Cherevko, A., Gyluj, I. (1997). New technologies carbohydrate vitamin phytonutrients and their use in products prophylactic action, Monograph. Kharkov, Ukraine, 285.
7. Pavljuk, R., Pogarskaya, V., Loseva S., Glubokij D., Matsipura A., Berestovaya A., Maximova N. (2010). Nanotechnology of frozen cryopastes of fruit and vegetables with unique characteristics - additives for functional dairy products. MOLOKOoperobka, 1, 24-29.
8. FAO/WHO. (2012). Policy measures to ensure food security in the region: problems and prospects - Food Forecast to 2050. Twenty-eighth FAO Regional Conference for Europe, 25.
9. Pavljuk, R., Pogarskaya, V., Timofeeva, N., Maksimova, N., Berestovaya, A., Borisenko, A. (2013). Nanotechnology frozen puree of citrus fruit with unique characteristics. Advanced equipment and technology of food production in restaurant industry and trade. Kharkov, Ukraine, 27-35.
10. Pavlyuk, R., Pogarskaya, V., Berestovaya, A., Timofeeva, N., Borisenko, T. (2013). Innovative ice-cream technology with using nanostructured frozen mixes of fruits and vegetables for healthy nutrition. Economy and technologies in the innovative development of the XXI century society. Saint-Petersburg, Russian Federation.124-127.