

Literatura

1. Winkler, F. Eliminierung von Abwasserinhaltsstoffen durch Kombination biochemischer und grenzflächenchemischer Mechanismen / F. Winkler, R. Kümmel, M. Stiebert, C. Kühne // *Acta hydrochim. et hydrobiol.* – 1987. – Vol. 15. – №3. – P. 281–296
2. Kuřskiy, A.L. Biologicheskaya ochistka promyshlennykh stochnykh vod / L.A. Kuřskiy, Ye.V. Sotnikova. Kiyev: Budivel'nik, 1965, 180 s.
3. Sirotkin, A.S. Agregatsiya mikroorganizmov: flokkuly, bioplenki, mikrobnyye granuly / A.S. Sirotkin, G.I. Shaginurova, K.G. Ippolitov. – Kazań: KGTU, –2006, – 176 s.
4. Demakov, V.A. Immobilizatsiya kletok mikroorganizmov: biotekhnologicheskiye aspekty / V.A. Demakov, Yu.G. Maksimova, A.Yu. Maksimov // *Biotekhnologiya.* – 2008, –№ 2, – s. 30-45.
5. Semenova Ye.N. Mikrobnaya transformatsiya soyedineniy azota v protsesse biofil'tratsii stochnykh vod: dis. na soiskaniye uch. stepeni kand. tekhn. Nauk // Ye.N. Semenova. Kazań, –2008, –136 s.
6. Sirotkin, A.S. Biologicheskaya transformatsiya soyedineniy azota v protsesse biofil'tratsii stochnykh vod / A.S. Sirotkin, Ye.N. Semenova, G.I. Shaginurova // *Biotekhnologiya.* – 2008, № 3, – s .77-85.
7. Li, Z. Comparative study of the nitrification characteristics of two different nitrifier immobilization methods / Z. Li, Z. Zhang, J. Li // *Biodegradation.* – 2009. – Vol. 20. – PP. 859-865.
8. Park, J.K. Microencapsulation of microbial cells / J.K. Park, H.N. Chang // *Biotechnology Advances.* – 2000. – Vol. 18. – PP. 303-319.
9. Kuznetsov, A.Ye. Nauchnyye osnovy ekobiotekhnologii: ucheb. posobiye: v 2 t. T.1 / A.Ye. Kuznetsov, N.B. Gradova. – M.: BINOM. Laboratoriya znaniy, 2010. – 629 s.
10. Stewart, P.S. Diffusion in Biofilms / P.S. Stewart // *Journal of bacteriology.* – 2003. – Vol. 185. – No. 5. – PP. 1485-1491.
11. Maier, R.H. Environmental microbiology / R.H. Maier, I.L. Pepper, C.P. Gerba. – San Diego: Academic Press, 2000. – 678 p.
12. Il'ina, T.S. Bioplenki kak sposob sushchestvovaniya bakteriy v okruzhayushchey srede i organizme khozyaina: fenomen, geneticheskiy kontrol' i sistemy regulyatsii ikh razvitiya / T.S. Il'ina, YU.M. Romanova, A.L. Gintsburg // *Genetika.* – 2004. – T. 40. – № 11. – S. 1445-1456.
13. Nikolayev, YU.A. Bioplenka – «gorod mikrobov» ili analog mnogokletochnogo organizma / YU.A. Nikolayev, V.K. Plakunov // *Mikrobiologiya.* – 2007. – T. 76. – № 2. – S. 149-163.
14. Flemming, H.-C. Biofilms. Investigative methods and applications. Technomic publishers / H.-C. Flemming, T. Griebe, U. Szewzyk / Lancaster, 2000. – 247 p.
15. Davey, M. Microbial Biofilms: from Ecology to Molecular Genetics / M. Davey, G. O'toole // *Microbiology and Molecular Biology Reviews.* – 2000. – Vol. 64. – No. 4. – P. 847-867.
16. Oleskin, A.V. Kolonial'naya organizatsiya i mezhkletochnaya kommunikatsiya u mikroorganizmov / A.V. Oleskin, I.V. Botvinko, Ye.A. Tsavkelova // *Mikrobiologiya.* – 2000. – T. 69. – № 3. – S. 309-327

17. Russell D. Monds1 and George A. O'Toole2, The developmental model of microbial biofilms: ten years of a paradigm up for review // Trends in Microbiology, Volume 17, Issue 2, 73-87, 21 January 2009
18. de Beer, D., P. Stoodley, F. Roe, and Z. Lewandowski. 1994. Effects of biofilm structure on oxygen distribution and mass transport. *Biotechnol. Bioeng.* 43:1131-1138.
19. Zhu, S. Effects of organic carbon on nitrification rate in fixed film biofilters / S. Zhu, S. Chen // *Aquacultural Engineering.* – 2001. – Vol. 25. – No. 1. – PP. 1-11.
20. Ling, J. Impact of organic carbon on nitrification performance of different biofilters / J. Ling, S.L. Chen // *Aquacultural Engineering.* – 2005. – Vol. 33. – No. 2. – PP. 150-162.
21. Michaud, L. Effect of particulate organic carbon on heterotrophic bacterial populations and nitrification efficiency in biological filters / L. Michaud, J.P. Blancheton, V. Bruni, R. Piedrahita // *Aquacultural Engineering.* – 2006. – Vol. 34. – No. 3. – PP. 224-233.
22. Nogueira, R. Nitrifying and heterotrophic population dynamics in biofilm reactors: effects of hydraulic retention time and the presence of organic carbon / R. Nogueira, L.F. Melo, U. Purkhold, S. Wuertz, M. Wagner // *Water Research.* – 2002. – Vol. 36. – No. 2. – PP. 469-481.
23. Ohashi, A. Influence of substrate C/N ratio on the structure of multi-species biofilms consisting of nitrifiers and heterotrophs / A. Ohashi, D.G. Viraj de Silva, B. Mobarry, J.A. Manem, D.A. Stahl, B.E. Rittman // *Water Science Technology.* – 1995. – Vol. 32. – PP. 75-84.
24. Satoh, H. Significance of substrate C/N ratio on structure and activity of nitrifying biofilms determined by in situ hybridization and the use of microelectrodes / H. Satoh, S. Okabe, N. Norimatsu, Y. Watanabe. *Water Science Technology.* – 2000. – Vol. 41. – PP. 317-321.
25. Lee, L.Y. Biofilm morphology and nitrification activities: recovery of nitrifying biofilm particles covered with heterotrophic outgrowth / L.Y. Lee, S.L. Ong, W.J. Ng // *Bioresource Technology.* – 2004. – Vol. 95. – No. 2. – PP. 209 - 214.
26. Cho, S. Development of a simultaneous partial nitrification and anaerobic ammonia oxidation process in a single reactor / S. Cho, N. Fujii, T. Lee, S. Okabe // *Bioresource Technology.* – 2011. – Vol. 102. – PP. 652-659.
27. Helmer, C. Simultaneous nitrification/denitrification in an aerobic biofilm system / C. Helmer, S. Kunst // *Water Science and Technology* – 1998. – Vol. 37. – No. 4. – PP. 183-187.
28. Han, D-W. Autotrophic nitrification and denitrification characteristics of an upflow biological aerated filter / D.-W. Han, H.-J. Yun, D.-J. Kim // *Journal of Chemical Technology and Biotechnology.* – 2001. – Vol. 76. – No. 11. – PP. 1112-1116.
29. Clifford, E. Nitrogen dynamics and removal in a horizontal flow biofilm reactor for wastewater treatment / E. Clifford, M. Nielsen, K. Sorensen, M. Rodgers // *Water Research.* – 2010. – Vol. 44. – PP. 3819-3828.
30. Schramm, A. Structure and function of a nitrifying biofilm as determined by in situ hybridization and the use of microelectrodes / A. Schramm, L.H. Larsen, N.P. Revsbech, N.B. Ramsing, R. Amann, K-H. Schleifer // *Applied and environmental microbiology.* – 1996. – Vol. 62/ - No 12. – PP. 4641-4647.
31. Voronov, YU.V. Vodootvedeniye i ochistka stochnykh vod / YU.V. Voronov, S. V. Yakovlev. – M.: Stroyizdat, 2002. – 530 s
32. Timonin, A.S. Inzhenerno-ekologicheskii spravochnik. Tom 2 / A.S. Timonin. – Kaluga: Izdatel'stvo N. Bochkarevoy, 2003 g. -884 s.

33. Yakovlev, S. V. Kanalizatsiya / S. V. Yakovlev, YA.A. Karelin, A.I. Zhukov. – M.: Stroyizdat, 1975. – 632 s.
34. SNIP 2.04.03-85 Kanalizatsiya. Naruzhnyye seti i sooruzheniya. – M.: TSITP Gosstroya SSSR, 1986. – 72 s.
35. Yakovlev, S. V. Biologicheskiye fil'try / S. V. Yakovlev, YU. V. Voronov. – M.: Stroyizdat, 1982. – 120 s.
36. Khentse, M. Ochistka stochnykh vod: Per. s angl./ M. Khentse, P. Armoes, Y. Lya-Kuryansen, E. Arvan. - M.: Mir, 2004. – 480 s.
37. Fomin, S.N. Ochistka bytovykh stochnykh vod stupenchatym biofil'trovaniyem / S.N. Fomin, M.I. Korobko. – Khabarovsk: Izd-vo DVGUPS, 2002. – 210 s.: il.
38. Lutsenko, G.N. Novoye napravleniye v razvitii protsessov biofil'trovaniya stochnykh vod / G.N. Lutsenko, V.A. Savina: Obzornaya informatsiya. – M.: TSBNTI Minzhilkomkhoza RSFSR, 1988. – 60 s.
39. Kravtsova, N.V. Ochistka stochnykh vod ot soyedineniy azota / N.V. Kravtsova, Ye.V. Sokolova M.: NIITEKHIM, 1977. -Vyp. 3. -56 s.
40. Kolobanov, S.K. Proyektirovaniye ochistnykh sooruzheniy kanalizatsii / S.K. Kolobanov, A.V. Yershov, M.Ye. Kigel' - Kiyev: Budivel'nik, 1977. - 224 s
41. Fdz-Polanco, F. Spatial distribution of heterotrophs and nitrifiers in a submerged biofilter for nitrification / F. Fdz-Polanco, E. Mendez, M.A. Uruena // Water Research. – 2000. – Vol. 34. – No. 16. – PP. 4081-4089.
42. Okabe, S. Spatial microbial distribution of nitrifiers and heterotrophs in mixed-population biofilms / S. Okabe, K. Hiratia, Y. Ozawa, Y. Watanabe // Biotechnology and bioengineering. – 1996. – Vol. 50. – No. 1. – PP. 24-35.
43. Kirilina, T.V. Biokonversiya soyedineniy azota i fosfora v protsesse biofil'tratsii stochnykh vod i ikh doochistki pogrzhennymi makrofitami: dis. na soiskaniye uch. stepeni kand. tekhn. nauk // T.V. Kirilina. – Kazan', 2011. – 130 s.
44. Kirilina, T.V. Biofil'tratsiya stochnykh vod dlya kompleksnogo udaleniya organicheskikh veshchestv i ammoniynogo azota / T.V. Kirilina, A.S. Sirotkin, G.I. Shaginurova, L.I. Seyt vapova // Ekologiya i promyshlennost' Rossii. – 2010. – № 9. – S. 14-17.
45. Kirilina, T.V. Otsenka usloviy protsessa biofil'tratsii stochnykh vod dlya glubokogo udaleniya soyedineniy azota i fosfora / T.V. Kirilina, A.S. Sirotkin, L.I. Seyt vapova, T.KH.Chan, N.KH.K. On // Voda: khimiya i ekologiya. – 2011. – № 1. – S. 24-28.
46. Kirilina, T.V. Prostranstvennoye raspredeleniye azottransformiruyushchikh mikroorganizmov v protsesse biofil'tratsii stochnykh vod / T.V. Kirilina, A.S. Sirotkin, M. Deneke // Voda: khimiya i ekologiya. - 2012. - № 5. - S. 60-65.
47. Zhmur, N.S. Tekhnologicheskiye i biokhimicheskiye protsessy ochistki stochnykh vod na sooruzheniyakh s aerotenkami / N.S. Zhmur. – M.: Akvaros, 2003. – 512
48. Huber, S.G. Einfluß der Prozeßführung auf Menge und Zusammensetzung von Protein und Polysacchariden im Ablauf von Sequencing-Batch Reactoren // Berichte aus Wassergüte und Abfallwirtschaft Techn. Univer. München. 1999. – No. 159. – 129p.
49. Schulz, J. Der Einfluß des Trägermaterials auf die Leistungsfähigkeit von Biofilmsystemen zur Abwasserreinigung / J. Schulz // Korrespondenz Abwasser. – 1993. – V.1. – SS. 68-73.
50. Lysak, V.V. Mikrobiologiya: ucheb. posobiye / V.V. Lysak. – Minsk: BGU, 2007. – 426 s
51. Lee, K.H. Simultaneous organic and nutrient removal from municipal wastewater by BSACNR process / K.H.Lee, J.H. Lee, T.J. Park // Korean Journal of Chemical Engineering. – 1998. – Vol. 15. – No. 1. – PP. 9-14.

52. Wu, G. Distributions and activities of ammonia oxidizing bacteria and polyphosphate accumulating organisms in a pumped-flow biofilm reactor / G. Wu, M. Nielsen, K. Sorensen, X. Zhan, M. Rodgers // *Water Research*. – 2009. – Vol. 43. – PP. 4599-4609.
53. Grachev V.A., Dorofeyev A.G., Aseyeva V.G., Nikolayev YU.V., Kozlov M.N. Dykhatel'naya aktivnost' ilov, ispol'zuyemykh v biologicheskoy ochistke stochnykh vod: Sb. statey i publikatsiy / MGUP Mosvodokanal. — M., 2008.-s. 190-200.
54. Stepanova N.YU. Ekologicheskiy monitoring protsessa biologicheskoy ochistki stochnykh vod i otsenka ikh vozdeystviya na prirodnyye vodoyemy: ucheb. posobiye k obshchemu kursu «Ekologicheskiy monitoring»/ N.YU. Stepanova, S.YU Selivanovskaya, O.V. Nikitin. – Kazan': KGTU, 2007. – 144 s.
55. Nielsen, P.H. FISH Handbook for Biological Wastewater Treatment. Identification and quantification of microorganisms in activated sludge and biofilms by FISH / P.H. Nielsen, H. Daims, H. Lemmer. – London: IWA Publishing, 2009. – 123 p.
56. Pernthaler, J. Fluorescence in situ hybridization. Method in microbiology: marine microbiology / J. Pernthaler, F.O. Glöckner, W. Schönhuber, R. Amann. – London, 2002. – 127 p.
57. Standard fixation of samples for FISH [Elektronnyy resurs]. – Rezhim dostupa: http://www.environmental-microbiology.de/pdf_files/Fixation_for_fish_2march2013.pdf
58. Standard protocol for FISH [Elektronnyy resurs]. – Rezhim dostupa: http://www.microbial-systems-ecology.de/pdf_files/StandardFISH_17aug2012.pdf
59. Bryukhanov A.L., Rybak K.V., Netrusov A.I. Molekulyarnaya mikrobiologiya: Uchebnik dlya vuzov. — M.: Izdatel'stvo Moskovskogo universiteta, 2012. — 480 s.
60. Akhmadullina F.YU. Raschet material'nogo balansa i osnovnogo oborudovaniya protsessov vodoochistki / F.YU. Akhmadullina, R.K. Zakirov, YU.V. Balakireva, I.M. Ibatullin. - Kazan': Kazan. gos. tekhnol. un-t, 2007. – 120 s.
61. Yakovlev S.V. Matematicheskoye modelirovaniye biofil'trov / S. V. Yakovlev, YU. V. Voronov, A. L. Ivchatov. – M.: Izd-vo MISI im. V. V. Kuybysheva, 1977. – 270 s.
62. Tavarkiladze, I.M. Metodika rascheta gorizonta'nykh biofil'trov dlya kommunal'nykh ob"yektov / I. M. Tavarkiladze, T. P. Tarasyuk. – Kiyev: Budivel'nik, 1979. – 210 s.
63. Pavlov, K.F. Primery i zadachi po kursu protsessov i apparatov khimicheskoy tekhnologii / K. F. Pavlov, P. G. Romankov, A. A. Noskov. – L.: Khimiya, 1987. – 576 s.;
64. Karelin, V.YA. Nasosy i nasosnyye stantsii / V.YA. Karelin, A.V. Minyayev. – M.: Stroyizdat, 1986. – 320 s
65. Aktualisierte Umwelterklärung 2012 – Würth [Elektronnyy resurs]. Rezhim dostupa: http://www.daimler.com/Projects/c2c/channel/documents/2367708_Aktualisierte_Umwelterkl_rung_Werth_2013.pdf
66. Khalilova, A.A. Biologicheskiy monitoring protsessov ochistki nikel'- i khromsoderzhashchikh stochnykh vod: dis. na soiskaniye uch. stepeni kand. tekhn. nauk // A.A. Khalilova. – Kazan', 2013. – 118 s.