

[Home](#) > [Journal](#) > [Earth & Environmental Sciences](#) > [JEP](#)
[Indexing](#) | [View Papers](#) | [Aims & Scope](#) | [Editorial Board](#) | [Guideline](#) | [Article Processing Charges](#)
[JEP](#) > Vol.3 No.3, March 2012



Nanofiltration Technology for Toxic or Harmful Ions Removal from Groundwater: Characteristics and Economic Analysis

PDF (Size: 327KB) PP. 249-253 DOI : 10.4236/jep.2012.33031

Author(s)

Xinzhu Yang, Xiaowei Wang

ABSTRACT

Nanofiltration (NF) membrane can efficiently remove the ions from groundwater, especially for high valence ions. Results show that the removal rate of fluoride was approximately 67% by the NF system, while for arsenic the removal rate was more than 93%. NF presented the well selective removal for fluoride. The quality of product water meets the national drinking water standards. Therefore, the application of nanofiltration technology can significantly improve the drinking water environment of rural areas, avoiding the secondary pollution caused by other chemical treatment processes. The water product cost of NF technology is about RMB 0.026 yuan per liter, application of the process of 2:1 NF membranes arrangement for toxic or harmful ions removal from groundwater, including investment cost and operating cost. Therefore, NF technology for harmful ions removal is more economical than the price of the market bottled water and suitable for application in rural areas of China.

KEYWORDS

Nanofiltration; Economic Analysis; Toxic or Harmful Ions; Groundwater

Cite this paper

X. Yang and X. Wang, "Nanofiltration Technology for Toxic or Harmful Ions Removal from Groundwater: Characteristics and Economic Analysis," *Journal of Environmental Protection*, Vol. 3 No. 3, 2012, pp. 249-253. doi: 10.4236/jep.2012.33031.

References

- [1] C. Zhu, G. Bai, X. Liu and Y. Li, " Screening High-Fluoride and High-Arsenic Drinking Waters and Surveying Endemic Fluorosis and Arsenism in Shanxi Province in Western China," *Water Research*, Vol. 40, No. 16, 2006, pp. 3015-3022. doi:10.1016/j.watres.2006.06.026
- [2] M. L. Donacian, L. J. J. Antonius, S. Fernando, M. Robert and D. Pamela, " The Effect of Fluoride on Enamel and Dentin Formation in the Uremic Rat Incisor," *Pediatric Nephrology*, Vol. 23, No. 11, 2008, pp. 1973-1979. doi: 10.1007/s00467-008-0890-2
- [3] Q. Wang, and W. Li, " Comparative Study on Fluoride Removal by NF and RO," *Water & Wastewater Engineering*, Vol. 35, 2009, pp. 17-20. doi: CNKI:SUN:JZJS.0.2009-07-005
- [4] A. Szymczyk, C. Labbez, P. Fievet, A. Vidonne, A. Foissy and J. Pagetti, " Contribution of Convection, Diffusion and Migration to Electrolyte Transport through Nanofiltration Membranes," *Advances in Colloid and Interface Science*, Vol. 103, No. 1, 2003, pp. 77-94. doi:10.1016/S0001-8686(02)00094-5
- [5] A. Seidel, J. J. waypa and M. Elimelech, " Role of Charge (Donnan) Exclusion in Removal of Arsenic from Water by a Negatively Charged Porous Nanofiltration Membrane," *Environmental Engineering Science*, Vol. 18, No. 2, 2001, pp. 105-113. doi:10.1089/10928750151132311
- [6] S. Choi, Z. Yun, S. Hong, et al., " The Effect Ofco-Existing Ions and Surface Characteristics of Nanomembranes on the Removal of Nitrate and Fluoride," *Desalination*, Vol. 133, No. 1, 2001, pp. 53-64. doi:10.1016/S0011-9164(01)00082-0
- [7] A. F. Reguillon, G. Lebuzeit, D. Murat, J. Foos, C. Mansour and M. Draye, " Selective Removal of

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[JEP Subscription](#)
[Most popular papers in JEP](#)
[About JEP News](#)
[Frequently Asked Questions](#)
[Recommend to Peers](#)
[Recommend to Library](#)
[Contact Us](#)

Downloads:	301,495
Visits:	672,959

Sponsors, Associates, and Links >>

- [The International Conference on Pollution and Treatment Technology \(PTT 2013\)](#)

- [8] C. K. Diawara, S. N. Diop, M. A. Diallo, M. Farcy and A. Deratani, " Performance of Nanofiltration (NF) and Low Pressure Reverse Osmosis (LPRO) Membranes in the Removal of Fluorine and Salinity from Brackish Drinking Water," *Journal of Environmental Protection*, Vol. 3, No. 12, 2011, pp. 912-917. doi: 10.4236/jwarp.2011.312101
- [9] B. Van der Bruggen, K. Everaert, D. Wilms and C. Vandecasteele, " Application of Nanofiltration for Removal of Pesticides, Nitrate and Hardness From Groundwater: Rejection Properties and Economic Evaluation," *Journal of Membrane Science*, Vol. 193, No. 2, 2001, pp. 239-248. doi:10.1016/S0376-7388(01)00517-8
- [10] K. Ko?uti?, L. Fura?, L. Sipos and B. Kunst, " Removal of Arsenic and Pesticides from Drinking Water by Nanofiltration Membranes," *Separation and Purification Technology*, Vol. 42, No. 2, 2005, pp. 137-144. doi:10.1016/j.seppur.2004.07.003
- [11] C. Ratantamskul, K. Yamamoto and T. Urase, " Effect of Operating Conditions On Rejection of Anionic Pollutants In the Water Environment by Nanofiltration Especially in Very Low Pressure Range," *Water Science Technology*, Vol. 34, No. 9, 1996, pp. 149-156. doi:10.1016/S0273-1223(96)00798-6
- [12] X. W. Wang, W. J. Liu, D. S. Li and W. F. Ma, " Arsenic (V) Removal from Groundwater by GE-HL Nanofiltration Membrane: Effects of Arsenic Concentration, pH, and Co-Existing Ions," *Frontiers of Environmental Science & Engineering in China*, Vol. 3, No. 4, 2009, pp. 428-433. doi:10.1007/s11783-009-0146-9
- [13] X. W. Wang, B. D. Xi, S. H. Huo, W. J. Liu and D. S. Li, " Defluorination from Groundwater in Rural China by Nanofiltration Technology: Performance and Multistage Arrangement," *Environmental Pollution and Public Health Special Track within iCBBE2011, Wuhan, 10-12 May 2011*, pp. 1-4. doi:10.1109/icbbe.2011.5780931