www.elsevier.com/locate/memsci

Chemical Cleaning of Ultrafiltration Membranes for Polymer-Flooding Wastewater Treatment: Efficiency and Molecular Mechanisms

Guicai Liu, Lei Li, Liping Qiu, Shuili Yu, Ping Liu, Youbing Zhu, Hu Jun, Zhiyuan Liu, Dongsheng Zhao, Haijun Yang

PII: S0376-7388(16)32569-8
DOI: http://dx.doi.org/10.1016/j.memsci.2017.08.062
Reference: MEMSCI15528

To appear in: *Journal of Membrane Science*

Received date: 18 December 2016
Revised date: 21 August 2017
Accepted date: 26 August 2017

Cite this article as: Guicai Liu, Lei Li, Liping Qiu, Shuili Yu, Ping Liu, Youbing Zhu, Hu Jun, Zhiyuan Liu, Dongsheng Zhao and Haijun Yang, Chemical Cleaning of Ultrafiltration Membranes for Polymer-Flooding Wastewater Treatment: Efficiency and Molecular Mechanisms, *Journal of Membrane Science,* http://dx.doi.org/10.1016/j.memsci.2017.08.062

Chemical Cleaning of Ultrafiltration Membranes for Polymer-Flooding Wastewater Treatment: Efficiency and Molecular Mechanisms

Guicai Liu[a,b], Lei Li[b], Liping Qiu[a], Shuili Yu[b,*], Ping Liu[d], Youbing Zhu[b], Hu Jun[c], Zhiyuan Liu[b], Dongsheng Zhao[b], Haijun Yang[c,*]

[a.]School of Civil Engineering and Architecture, University of Jinan, Jinan 250022, PR China

[b]School of Environmental Science and Engineering; State Key Laboratory of Pollution Control and Resource Reuse; Tongji University; Shanghai, China, 200092

[c]Interfacial Water Division & Key Laboratory of Interfacial Physics and Technology, Shanghai Institute of Applied Physics, Chinese Academy of Sciences, PO Box 800-204, Shanghai 201800, P.R. China.

[d]College of Architecture and Civil Engineering, Xi'an University of Science and Technology, Xi'an, China, 710054

ysl@tongji.edu.cn

yanghaijun@sinap.ac.cn

*Corresponding author. Phone: 02165982708.

*Corresponding author. Phone: 02139523396.

Abstract

In a polymer-flooding wastewater treatment process, physically irreversible fouling of ultrafiltration (UF) membranes is severe and inevitable. Particularly, anionic polyacrylamide (APAM) aggravated flux loss is a challenge in flux recovery. Chemical cleaning procedures for polyvinylidene fluoride (PVDF) UF membranes fouled by polymers (e.g., APAM) were designed by investigating their cleaning efficiency, synergistic effect and molecular interactions based on the molecular mechanisms of polymeric fouling. The cleaning efficiency and foulant–foulant intermolecular interactions indicated that the destruction of the hydrogen-bonded network, egg-box shaped gel network, and interpenetrating polymer network using sodium hypochlorite (NaClO), ethylenediaminetetraacetic acid (EDTA) and dodecyl trimethyl ammonium chloride (DTAC) solutions, respectively, led to significant flux recovery. The synergistic relationships between the two types of cleaning reagents were different in the mixed solutions and sequential procedures. In addition, oil