Treatment of reverse osmosis concentrate by electrolysis and MBR process

Chan Young Kang, Jeong Jun Lee, Joon-Seok Kang, Young Soo Kim, Han-Seung Kim*

Department of Environmental Engineering and Energy, Myongji University, San 38-2, Nam-dong, Cheoin-gu, Yongin-si 449-728, Kyonggi-do, Korea, Tel. +82 31 330 6695; email: kimhs210@mju.ac.kr (H.-S. Kim)

Received 19 November 2014; Accepted 15 January 2015

ABSTRACT

In this study, the reverse osmosis (RO) concentrate treatment technology, which combines the electrolysis process with the MBR process, has been suggested to treat the RO concentrate generated in the water recycle process, which applied the RO membrane. The electrolysis process constructed in this study is to reduce the MBR process load by removing the non-degradable matters and the nitrogen compound, which are the weakness of biological treatment. When treating the RO concentrate through the electrolysis, the disinfection by-products—like residual chlorine, THMs and so forth—are generated. Since this reaction of the by-products affects the microbes, PAC was injected within the MBR reactor to desalinate the treated water. As the MBR process shows considerably high treatment efficiency for the organic matters and can increase the concentration of the activated sludge within reactor, it is effective to treat the nitrogen and phosphorus, which cause the eutrophication of water, but since there is a limit in treating the RO concentrate with this single process, such a hybrid process was suggested. The comparative experiment was performed depending on whether the electrolysis-applying pretreatment of RO concentrate has been applied or not, and whether the PAC has been injected within MBR or not. As a result, the DOC, T-N and T-P removal efficiency of the suggested process was each approximately 98.0, 40.0 and 45.6%, respectively. The experiment results showed that the suggested process has great potential in RO concentrate treatment.

Keywords: Membrane bioreactor; Electrolysis; Wastewater reclamation; Reverse osmosis concentrate; Powdered activated carbon

*Corresponding author.

Presented at IDW 2014 — The 7th International Desalination Workshop, November 5–8, 2014, Jeju, Korea

1944-3994/1944-3986 © 2015 Balaban Desalination Publications. All rights reserved.