

課題番号 : F-16-KT-0154
利用形態 : 機器利用
利用課題名(日本語) : 微量化学物質除去に及ぼす有機膜表面のゼータポテンシャルの影響の検討
Program Title(English) : Effects of zeta-potential of organic membrane surface on removal efficiencies of micro-pollutants
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1. 概要(Summary)

Perfluorohexanoic acid (PFHxA), an emerging contaminant, has been detected at a high level in the water environment. Its possible presence in drinking water treatment process thus suggests that removal technique should be developed. In this study, one reverse osmosis (RO) membrane, two nanofiltration (NF) membranes and two ultrafiltration (UF) membranes were tested to reject PFHxA (100 – 300 ng/L) in pure water. The measured MWCO (Molecular Weight Cut Off) of two NF membranes were as large as 10,000 and 27,000 Da, while they were still able to reject 96.3% and 95.3% PFHxA in pure water, respectively. This indicates PFHxA rejection rate was not dependent on the MWCO of membrane. Results also show that membrane with more negative zeta-potential tends to have higher rejection rate to PFHxA in pure water, suggesting that electrical repulsion between PFHxA and membrane might play an important role in PFHxA rejection. In conclusion, NF membranes would be a better option for removing PFHxA from drinking water than RO membrane because of their larger pure water permeability and NaCl transmission.

2. 実験(Experimental)

【利用した主な装置】

ゼータ電位・粒径測定システム

【実験方法】

ゼータ電位・粒径測定システムを用いて、複数の有機

膜表面のゼータ電位を計測した。

3. 結果と考察(Results and Discussion)

1) Two loose NF membranes were found to have high rejection rates to PFHxA in pure water. These two NF membranes may be better options for removing PFHxA from drinking water than RO membrane due to higher PWP and lower NaCl rejection rates.

2) The rejection rates of membranes to PFHxA were not dependent on the MWCO of membranes. Membranes with large MWCO could still have high rejection rate to the PFHxA in pure water.

3) Membrane with more negative zeta-potential tends to have higher rejection rate to PFHxA. This suggests that electrical repulsion between PFHxA and membrane surface might play an important role in the rejection of PFHxA by membrane.

4. その他・特記事項(Others)

・参考文献

[1] Fei C *et al.*, Environ Health Perspect, (2007) 1677-1682.

5. 論文・学会発表(Publication/Presentation)

(1) Chenghui ZENG, Shuhei TANAKA, Yuji SUZUKI, Satoru YUKIOKA, and Shigeo FUJII, Rejection of Trace Level Perfluorohexanoic Acid (PFHxA) in Pure Water by Loose Nanofiltration Membrane, Journal of Water and Environment Technology, (accepted), 2017.

6. 関連特許(Patent)

なし。