



A statistical approach to analyze factors affecting silt density index

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ABSTRACT

Silt Density Index (SDI) has been used as the most popular fouling index for reverse osmosis (RO) feed water to select a proper pretreatment option for RO processes. However, SDI lacks the fundamental consideration of RO membrane fouling, because SDI is supposed to be only sensitive to particles larger than 0.45 μm in diameter while fine particles (which can pass through a 0.45 μm filter) and dissolved organic matters can be potent foulants for RO processes. Our study started from the suspected performance of SDI based on its lack of the fundamental basis. Various sources of SDI data from nine literatures were collected and analyzed with turbidity and dissolved organic carbon (DOC). Interestingly, the result of our study shows that SDI can express the amount of particulate and organic fouling together. SDI can be described as a function of turbidity, DOC, and a categorical binary variable, M , for pretreatment type (i.e., $M = 1$ for membrane filtration and $M = 0$ for other methods). SDI increases if either of turbidity or DOC becomes higher and membrane filtration is not used as a pretreatment option according to the multiple linear regression method using various data sources. Therefore, our study concludes that SDI can measure the potential of fouling effectively.

Keywords: Silt density index (SDI); Dissolved organic matter; Turbidity; Reverse osmosis (RO); Fouling

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