

Electrochemical oxidation and UV irradiation to target organic foulants during pressure driven membrane operation

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Abstract:

This study demonstrates an innovative and highly flexible hybrid system consisting of electrochemical oxidation and UV irradiation for controlling membrane fouling. The system can be coupled with any pressure driven membrane processes. When combined with microfiltration, extended operation beyond 600 hours of continuous operation can be achieved without backwashing. When combined with reverse osmosis, the system also resulted in significantly less fouling and superior permeate quality compared to conventional ultrafiltration pretreatment. Through advanced analytical techniques to characterise the organic composition and monitor the fate of oxidising agents, we have systematically demonstrated the ability to tune our hybrid process to selectively target key organic foulants in the feed water. Therefore, the technique is highly efficient, as also confirmed by preliminary energy consumption calculation.

Keywords: membrane fouling, electrochemical oxidation, UV irradiation, ceramic membrane, reverse osmosis.