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Nanofiltration vs. reverse osmosis for the removal of emerging organic contaminants in water reuse

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ABSTRACT

Reverse osmosis (RO) in existing water reuse facilities is a water industry standard. However, that approach may be questioned taking into consideration that "tight" NF can be equal or "better" than RO. NF can achieve the same removals of RO membranes when dealing with emerging organic contaminants (pharmaceuticals, pesticides, endocrine disruptors and others). Experiments using 18 emerging contaminants were performed using membranes NF200 and NF90 at bench-scale units, and for a more complete study, results of NF and RO pilot and full-scale experiments where compared to our experimental results. The removal results showed that NF can remove many emerging contaminants. The average removal by tight NF was 82% for neutral contaminants and 97% for ionic contaminants. The average removal by RO was 85% for neutral contaminants and 99% for ionic contaminants. Aquifer recharge and recovery (ARR) followed by NF can effectively remove emerging contaminants with removals over 90% when loose NF membranes are used.

Keywords: Water reuse; Nanofiltration; Reverse osmosis; Emerging contaminants

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