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A Comparative Study of Inorganic Fouling by CaSO4 and Ca3(PO4)2 on Nanofiltration Membranes

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A COMPARATIVE STUDY OF INORGANIC FOULING BY CaSO4 AND Ca3(PO4)2 ON NANOFILTRATION MEMBRANES

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Inorganic scaling caused by the accumulation of inorganic salts on membrane surface is one of the major limitations for the use of nanofiltration membranes in drinking water treatment. In this study, we investigated the characteristics and mechanism of inorganic scaling on nanofilters by CaSO4 and Ca3(PO4)2 by observing the flux decline behavior during filtration. At 3.2 10-3 m/s and 345 KPa, 90% and 70 % of the total flux was reduced due to CaSO4 and Ca3(PO4)2 fouling, respectively. This indicates that CaSO4 fouling contributed a greater resistance than Ca3(PO4)2 fouling. The fouling of CaSO4 was characterized by reversible cake growth caused by both bulk and surface crystallization at lower operating pressure, and by surface crystallization at higher operating pressure. The fouling of Ca3(PO4)2 was characterized by both irreversible pore/surface adsorption and reversible cake growth through surface crystallization regardless of the operating conditions. Furthermore, comparison of various resistance terms of Ca3(PO4)2 fouling indicated that that the total cake resistance was much greater than the irreversible resistance. These findings indicate that the types of fouling solutes in feed water as well as operating parameters of membrane filtration needs to be considered when evaluating inorganic fouling of nanofilter.

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