Influence of inorganic scalants and natural organic matter on nanofiltration membrane fouling

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Abstract: The influence of inorganic scalants and NOM on nanofiltration (NF) membrane fouling was investigated by a crossflow bench-scale test cell. Mathematical fouling models were used to determine kinetics and fouling mechanisms of NF membrane. It was observed that, with natural organic matter (NOM) at a concentration of 10 mg L-1, divalent cation, i.e. calcium (Ca2+), exhibited greater flux decline than monovalent cation, i.e. sodium (Na+), while solution flux curves dominated cake formation model, especially at high ionic strength. For inorganic scalants of polyanions, i.e. carbonate (CO32-), sulphate (SO42-), and phosphate (PO43-), solution flux curves were relatively fitted well with pore blocking model, possibly due to precipitated species formed and blocked on membrane surface and/or pores. For different divalent cations (i.e. calcium and magnesium (Mg2+)), calcium showed greater flux decline than magnesium, possibly due to higher concentration of precipitated calcium species than that of precipitated magnesium species based on the pC (-log concentration) and pH diagram.

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