Enhancing organic matter removal in desalination pretreatment systems by application of dissolved air flotation - DTU Orbit (08/11/2017)

Enhancing organic matter removal in desalination pretreatment systems by application of dissolved air flotation

Membrane fouling in reverse osmosis (RO) systems caused by organic matter (OM) remains a significant operational issue during desalination. Dissolved air flotation (DAF) has recently received attention as a pre-treatment option for seawater OM removal; however, only a limited number of studies have been undertaken. This may be because it is difficult to characterise OM in seawater due to the high salt content and low carbon concentration. In this study, DAF pre-treatment experiments were conducted using a model seawater solution, and real seawater and brackish water samples. DAF performance was determined via conventional water quality parameters as well as fluorescence excitation-emission matrix (FEEM) spectroscopy and liquid chromatography with organic carbon detection (LC-OCD). Biopolymers and humic substances were the major organic fractions removed between 38 and 84% and 20-61% depending on the sample, respectively. The optimal normalised coagulant dose (Fe3+ to DOC ratio) was observed to be 0.5-4 at pH5.5 increasing to 4-12 at pH7.5. At pH5.5, the optimum coagulant dose increased with increasing humic character of the feed water. Overall, the OM removal efficiency by DAF observed in this study was higher than reported for other membrane-based processes; a combination of DAF and biofiltration is likely to be complementary.

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