THE EFFECT OF PRETREATENT PROTOCOLS UPON THE FOULING AND CLEANING CHARACTERISTICS OF UF AND MF MEMBRANES

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ABSTRACT

In addition to system thermo-hydraulics and the relative sizes of feed species and membrane pores, the hydrophobicity, roughness and charge of a membrane can all affect fouling and cleaning characteristics.

In certain systems it may therefore be possible to selectively adsorb key foulants to the membrane surface, leading to the generation of a beneficial fouling layer. Such a layer can lead to improvements in permeate flux and selectivity for the system concerned [1, 2]. Similarly, cleaning the membrane before filtration can also alter the separation process and the types of foulants subsequently attaching to the surface [3]. This can be extended beyond simple conditioning (which is needed to remove a preservative layer of glycerine which new polymeric membranes are typically coated with during manufacture) to form an anti-fouling pretreatment strategy.

In this paper we compare the effect of two pretreatment methods for a the filtration of (*i*) a spent sulphite liquor (17.8 wt% dry solids) using a 20 kDa molar mass cut off (MMCO) fluoropolymer membrane and (*ii*) a molasses solution (45º Brix) using a polysulphone (Ps*f*) membrane (1.5 μm pore size). Both feeds are industrially relevant, and subject to severe fouling issues when membranes are used in their subsequent processing. The pretreatment methods used involved: (*i*) conditioning with water at 60˚C only, and (*ii*) conditioning with water at 60˚C followed by cleaning with 0.5 wt% NaOH.

Fouled membrane surfaces were subsequently characterised using (*i*) Fourier Transform Infra Red (FTIR) spectral peak height analysis, (*ii*) streaming potential measurements, and (*iii*) contact angle measurements.

Results are presented showing that pretreatment affects both the composition of the subsequent fouling, and the resulting permeate flux.

References

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