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Characterisation of polysaccharide fouling of an ultrafiltration membrane using model solutions

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ABSTRACT

Polysaccharides (PSs) have been identified to cause long term mechanically irreversible fouling in membrane bioreactors, although findings are still contradictory, partly due to the fact that generally lump concentrations are measured. To elucidate contributing factors to the varying fouling propensity of PSs, the influence of the characteristics of the PSs on membrane fouling was studied by comparing the filterability of different solutions of model PSs using the Berlin filtration method (BFM), which uses a novel air-sparged *in situ* filtration test cell. Critical fluxmeasurements were performed with solutions of eight different substances: xanthan gum, alginate, carrageenan, starch, carboxymethylcellulose (CMC), pectin, agarose and heparin, in which pH and conductivity were adjusted at 7.5 and 800 μS/cm, respectively. The protocol used for the critical flux determination included relaxation and, in some cases, irreversible fouling could be detected. No relationship was found between critical flux characteristic of short term mechanically reversible fouling and the following investigated parameters: PS concentration, transparent exopolymer particles (TEP), viscosity and molecular weight (MW) of the PSs. Severe irreversible fouling was found for agarose and carrageenan. Results stress the need a) to be aware of differences in fouling propensity when model PSs are used in fouling investigations and b) not to over-interpret findings based on lump concentrations.

Keywords: Membrane filtration; Fouling; Critical flux; Model polysaccharides

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