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THE FOULING OF ULTRAFILTRATION MEMBRANES USING MODEL TEA COMPONENT SOLUTIONS

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ABSTRACT

The aggregation products formed by the interaction of tea proteins and polyphenols are considered to be major foulants limiting the operation of ultrafiltration membranes during the processing of cold black tea liquor to produce a haze and tea cream free product. The fouling performance of a polysulphone membrane (MWCO 30 kD) was investigated using (i) instant black tea liquor and (ii) model solutions consisting of tea proteins, theaflavins (TFs), and thearubigins (TRs) during dead-end ultrafiltration. Static absorption experiments were carried out to examine the fouling occurring on membrane surfaces. The subsequent membrane cleanability was also studied using sodium hydroxide as a cleaning agent. Contact angle, TEM and FTIR techniques were used to characterise physical, chemical and morphological changes occurring to membranes and deposits after fouling and cleaning. HPLC, assay and I^*a*b^* colour measurements were used to characterise permeate quality. These results increase our understanding of UF membrane fouling and cleaning mechanisms, and consequently are of direct interest in the commercial production of ready to drink tea products