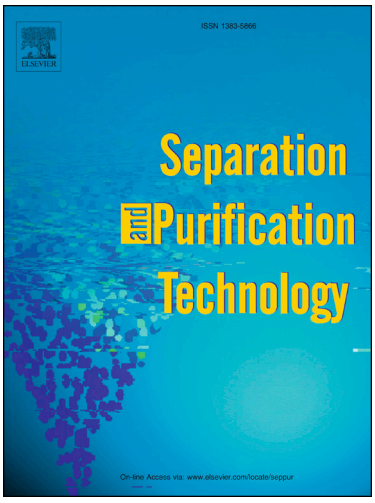

Downstream processing of an oxidized industrial kraft liquor by membrane fractionation for vanillin and syringaldehyde recovery

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Downstream processing of an oxidized industrial kraft liquor by membrane fractionation for vanillin and syringaldehyde recovery

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Abstract

A membrane fractionation study of an oxidized industrial kraft liquor was performed with 50, 5 and 1 kDa molecular weight cut-off membranes to study the productivity of each membrane and the respective apparent rejection coefficients (R_i) to total solids (TS), ashes and low molecular weight phenolates (TP). Cleaning efficiency of each membrane was evaluated and the contribution of fouling for flux decline was analyzed by applying the resistances-in-series approach.

During membrane fractionation sequence, TS content in the permeate stream gradually decreased from 86.5 g L^{-1} to 75.3 g L^{-1} (50 kDa), 64 g L^{-1} (5 kDa) and 58.6 g L^{-1} (1 kDa). The R_i values observed for TS were 25.3%, 29.1% and 15.1% for 50, 5 and 1 kDa membrane processing, respectively. TP were not retained by the 50 kDa membrane while, for the 5 and 1 kDa membranes, R_i of 11.5% and 9.0% were observed, respectively. The initial TP concentration (2.4 g L^{-1}) was maintained in the first membrane stage, while for the other stages decreased slightly for 2.22 g L^{-1} (5 kDa) and 2.15 g L^{-1} (1 kDa). Nevertheless, in terms of composition (%w/w_{TS}), an enrichment in TP was observed in all three stages from 2.8% (feed) to 3.2% (50 kDa), 3.5% (5 kDa) and 3.7% (1 kDa).

The initial water fluxes were recovered within 2-3 cycles of chemical cleaning and fouling evaluation indicated that reversible fouling was very relevant component for the 50 and 1 kDa membrane processing while irreversible fouling component was more pronounced for the 5 kDa membrane processing.

Key-words: ultrafiltration; oxidized lignin; phenolic monomers, biorefinery