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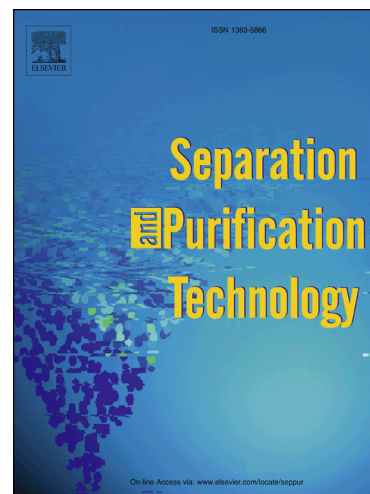
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Separation and recovery of polyphenols and carbohydrates from *Eucalyptus* bark extract by ultrafiltration/diafiltration and adsorption processes

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Abstract

The processing of ethanol:water 52:48 %v/v extract of *Eucalyptus globulus* bark containing bioactive polyphenols by ultrafiltration in diafiltration (DF) mode and adsorption/desorption was investigated. Three approaches for membrane processing were studied in DF mode using polymeric membranes (30 and 5 kDa). One of these approaches (pre-concentration followed by DF with 30 kDa membrane) provided an increment of 21% and 64% of total phenolic compounds (TPC) and proanthocyanidins (Pac), respectively, relative to the initial ethanolic extract composition. The resulting retentate was further purified by fixed-bed adsorption/desorption using a pre-selected polymeric adsorbent (SP700). By desorbing with ethanol:water 95:5 %v/v about 45% of the carbohydrates (TC) were eliminated and an enriched fraction in polyphenols was obtained. The combination of these two environmentally-friendly technologies (DF and adsorption/desorption) as downstream processing produces a concentrate of the bark extract with 12.4 g L⁻¹ (67 % w/w_{dried weight}) of TPC, 10.3 g L⁻¹ (55 % w/w_{dried weight}) of Pac, and 1.6 g L⁻¹ (9 % w/w_{dried weight}) of TC. Finally, a flowchart for an integrated process of extraction, membrane processing and adsorption/desorption was proposed to obtain enriched fractions of polyphenols, with the additional possibility of the ethanol and water recovery in both diafiltration and adsorption/desorption steps to be reused in the extraction step of the process. Moreover, the integrated process also led to the recovery of low molecular weight phenolic compounds at the permeate stream during membrane processing and the recovery of galacturonic acid rich carbohydrates coming from the washing step of the fixed-bed process.

Key-words: ultrafiltration; adsorption; polyphenols recovery; *Eucalyptus* bark; biorefinery

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