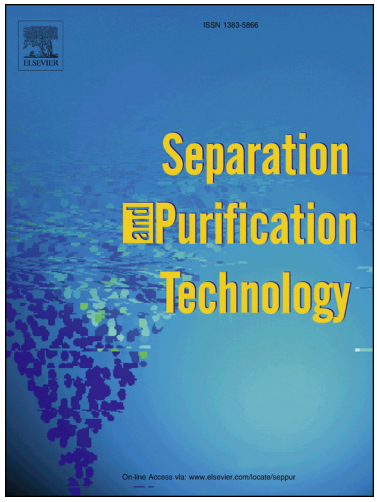

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Abstract

The agro-industrial sector generates large amounts of coproducts such as lignocellulosic biomass which could be valorized into many chemicals and bio-based intermediates (sugars, paper pulp, surfactants, polymers or bioethanol). However, in the case of biomass hydrolysis by diluted sulfuric acid, current downstream processes involve a partial or complete neutralization which are not satisfactory for economic and environmental reasons.

This work presents a purification process of pentoses from hemicellulosic hydrolysates without neutralization for sulfuric acid recovery. Compared to conventional processes, less energy, water and chemicals are required. Very promising results were obtained at pilot scale with 100 L of wheat bran hydrolysates. The process is based on the combination of ultrafiltration, conventional electrodialysis and ion-exchange.

Ultrafiltration with a 10 kDa organic membrane totally removed harmful macromolecules which precipitate during electrodialysis operation because of pH rise. Till a volumetric concentration factor 3.6, the average flux kept good for industrial application (27 $L.h^{-1}.m^{-2}$). However suspended materials have to be filtered before ultrafiltration. Besides, a 2.5 diafiltration is required to recover most of sugars (99%).

Then conventional electrodialysis was performed to recover most of sulfuric acid (80%). The average faradic yield was quite good (80%) and the specific energy consumption of the electrodialysis stack was quite interesting (1.1 kWh per kg of H_2SO_4 recovered and 8.4 kWh