

Author's Accepted Manuscript

Detoxification of highly acidic hemicellulosic hydrolysate from wheat straw by diananofiltration with a focus on phenolic compounds

Axel Fayet, Andreia R.S. Teixeira, Florent Allais, Marielle Bouix, Marie-Laure Lameloise



PII: S0376-7388(18)31181-5
DOI: <https://doi.org/10.1016/j.memsci.2018.08.045>
Reference: MEMSCI16419

To appear in: *Journal of Membrane Science*

Cite this article as: Axel Fayet, Andreia R.S. Teixeira, Florent Allais, Marielle Bouix and Marie-Laure Lameloise, Detoxification of highly acidic hemicellulosic hydrolysate from wheat straw by diananofiltration with a focus on phenolic compounds, *Journal of Membrane Science*, <https://doi.org/10.1016/j.memsci.2018.08.045>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Detoxification of highly acidic hemicellulosic hydrolysate from wheat straw by dnanofiltration with a focus on phenolic compounds

Axel Fayet^{a,b,c}, Andreia R.S. Teixeira^{a,b}, Florent Allais^a, Marielle Bouix^c, Marie-Laure Lameloise^{b,*}

^aChaire Agro-Biotechnologies Industrielles (ABI), AgroParisTech, 51110 Pomacle, France

^bUMR Ingénierie Procédés Aliments, AgroParisTech, INRA, Université Paris-Saclay, 91300 Massy, France

^cUMR GMPA, AgroParisTech, INRA, Université Paris-Saclay, 78850 Grignon, France

*Corresponding author: AgroParisTech, 1 avenue des Olympiades 91744 Massy Cedex, France, Tel: +33 01 69 93 50 76 ; Marie-laure.lameloise@agroparistech.fr

Abstract

Nanofiltration was studied for detoxification of lignocellulose hydrolysates obtained in harsh conditions. A hemicellulosic hydrolysate obtained from sulfuric acid steam explosion of wheat straw and presenting very low pH (=1) and high osmotic pressure (28 bar) was studied and 8 inhibitory compounds were followed, among which 4 phenolic compounds. Several polymeric nanofiltration membranes were compared for separation performances and permeabilities; DK membrane (GE Osmonics) proved suitable with high rejection of sugars (> 99%) and lower rejections of inhibitors. Acetic acid and furfural were quasi-fully transmitted whereas the rejection of compounds ranked as follow: HMF (5-hydroxymethyl-furfural) < coumaric acid < levulinic acid < vanillin < ferulic acid < syringaldehyde with values of 40, 50, 60, 80, 90 and 98%, respectively, at a permeate flux of 14 L h⁻¹ m⁻². Diafiltration was carried out at a transmembrane pressure of 26 bar until 3 DV (Diafiltration Volume) to complete detoxification, and continuous and sequential-dilution modes were compared. Thanks to the permeability of the membrane to the monovalent form of sulfuric acid HSO₄⁻, effective transmembrane pressure was increased and pH reached 2. At 3 DV, both modes showed removal performances between 92% (acetic acid and furfural) and 25% (syringaldehyde). Irreversible fouling was observed, leading to 30% permeability loss after diafiltration.

Keywords

Hemicellulosic hydrolysate; detoxification; nanofiltration; diafiltration; phenolic compounds;

Download English Version:

<https://daneshyari.com/en/article/8960306>

Download Persian Version:

<https://daneshyari.com/article/8960306>

[Daneshyari.com](https://daneshyari.com)