

Ultrafiltration of hydrolysis products from xylan *Eucalyptus* wood

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1. Summary

The aim of this work was the purification of xylooligosaccharides (XOS) from *Eucalyptus globulus* wood autohydrolysis liquors using ultrafiltration membranes. Tubular ceramic membranes with cut-offs in the range 1 to 50 kDa were used to process autohydrolysis liquors to obtain concentrates containing XO of increased purity, owing to the preferential removal of both monosaccharides and non-saccharide compounds in permeates.

Keywords: *Eucalyptus globulus* wood, xylooligosaccharides, membranes, purification

2. Extended Abstract

2.1. Introduction

Xylooligosaccharides can be used as ingredients for functional food due to its prebiotic effect. When ingested in diet, XOS behave as non-digestible oligosaccharides, reaching the gut, where they favour the proliferation of healthy microorganisms as *Bifidobacteria* and facilitate the reduction of entero-putrefactive and pathogenic intestinal bacteria by increasing the production of short chain fatty acids.

2.2. Autohydrolysis processing of rice husks

Eucalyptus globulus wood samples were milled to a particle size lower than 8 mm and mixed with distilled water at a water to dry solid ratio of 8 kg/kg. The mixture was heated in a stirred pressurized reactor until reaching 196 °C, the optimum temperature to produce XOS (Garrote, 2002). At the end of treatments, the solids were separated by filtration and the liquors were recovered, analyzed and processed with membranes. Table 1 shows the composition of the autohydrolysis liquors obtained with *Eucalyptus globulus* wood under the conditions employed in this study.

2.3. Membrane processing of liquors

Experiments at full recirculation mode were carried out with autohydrolysis liquors to determine the optimum conditions for concentration and purification. The assays were performed measuring the time dependence of permeability at the considered transmembrane pressure (TMP), and increasing the TMP once stable flow was achieved.

Additional experiments were run in concentration mode (removing the permeate) at the optimum TMP determined previously.

Table 1. Composition of *Eucalyptus wood* autohydrolysis liquors obtained at 196 °C.

a) Mass fraction of non volatile compounds (NVC) (kg NVC/kg liquor) = 0.02731

b) Composition of NVC:

Component	Mass fraction (kg/kg NVC)
Glucose	0.02410
Xylose	0.16982
Arabinose	0.03015
Acetic acid	0.03619
Glucooligosaccharides (GOS)	0.02733
Xylooligosaccharides (XOS)	0.48696
Acetyl groups linked to oligosaccharides	0.07338
Uronic acids	0.05810
ONVC ¹	0.13017

¹ONVC: Other non-volatile compounds.

Figure 1 shows the retention of the different components of the autohydrolysis liquor at different TMP in experiments performed with a membrane of 5 kDa cut-off. In this case, near the 80 % of XOS contained in feed were present in the retentate, in comparison with 20 % of the initial monosaccharides.

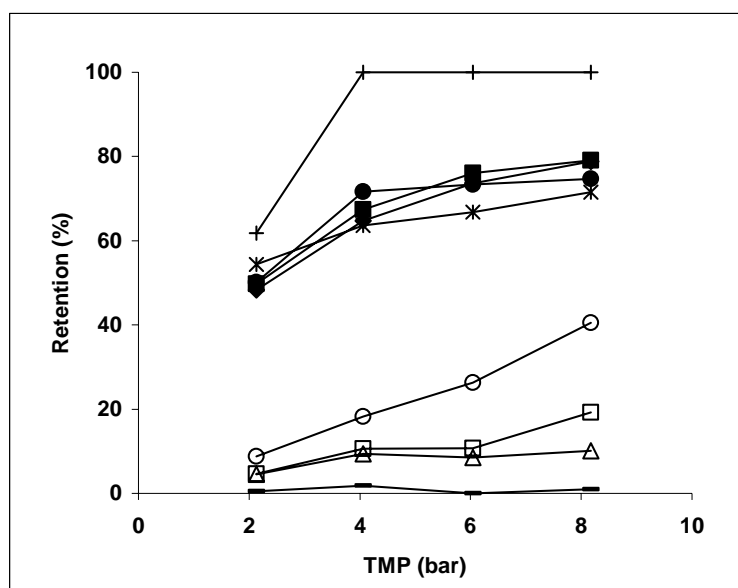


Figure 1. Retention of the different components of the autohydrolysis liquors using a 5 kDa ceramic membrane. (○) glucose; (□)xylose; (△)arabinose; (-) acetic acid; (●) GOS; (■) XOS; (◆)acetyl groups linked to oligosaccharides; (*) uronic acids; (+) ONVC.

References

Garrote, G., Parajó, J.C., (2002) Non-isothermal autohydrolysis of *Eucalyptus wood*, *Wood Science and Technology*, 36, 111–123.