Recovery of xylose from oil palm frond (OPF) bagasse hydrolysate using commercial spiral-wound nanofiltration membrane

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ABSTRACT
Oil palm frond (OPF) is the most abundant agriculture waste in Malaysia. This agriculture waste contains lignocellulosic materials that are potentially to be used as renewable material for production of value-added products such as biosugar (i.e. xylose and glucose). Xylose is an intermediate product in xylitol production and glucose interferes in the process of separation. These two different types of monosaccharides can possibly be separated using nanofiltration (NF) membrane according to their molecular size rather than diffusivities. Thus, the aim of this study was to develop and evaluate the performance of pilot-scale commercial spiral-wound NF membranes (Desal-5 DK, Desal-5 DL and NF90) for separation of xylose from glucose. Using the synthetic sugar solution model, the Desal-5 DK membrane exhibited the highest xylose separation factor up to 1.17 at the operating pressure of 10 bar, while the other two membranes were unable to separate the sugars (separation factor less than 1). For the recovery of xylose from the real OPF bagasse hydrolysate, the Desal-5 DK membrane performs very well with xylose separation factor of 1.63. Overall, it can be concluded that the spiral-wound NF membrane is cost-effective and offers easy maintenance, which has high potential application in large-scale separation of xylose-glucose from OPF bagasse hydrolysate.

KEYWORDS
Agriculture waste; Renewable material; Bagasse hydrolysate

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