

Feasibility Study of Pineapple (*Ananas cosomus*) Leaf Fibres (PALFs) for Cellulosic Microfiltration Membrane

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ABSTRACT

The study was conducted to investigate the possibility of using pineapple leaf fibres (PALFs) as an alternative source of cellulose polymer for membrane fabrication. The membranes were fabricated from dope solution containing cellulose/ N-methylmorpholine-N-oxide (NMMO)/polyethylene glycol (PEG 400)/ N-propylgallate with a mass ratio of 8/ 88/ 3.5/ 0.5 by using immersion precipitation method. The permeation characteristics, structure and morphology of the membranes were investigated upon substituting the former cellulose source by the means of microfiltration rate (MFR), rejection rate (RR), Fourier Transform Infrared (FTIR) spectroscopy and Scanning

ISSN 1675-7939

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Electron Microscopy (SEM), respectively. It was found that membranes derived from PALFs exhibited higher RR of 86.51%, but slightly lower MFR (i.e. 91.79 mLh⁻¹m⁻²mmHg⁻¹) than the former membrane type under an applied pressure of 10 psi. Both of the membrane types (i.e. PALFs and hardwood) possess analogous chemical structures which have been confirmed by the existence of similar functional groups detection. Meanwhile, SEM analysis revealed that the source of cellulose had brought profound effect on the structural and morphology of resultant membranes. In general, matte and porous surfaces in a sponge-like configuration and uniform granular microporous structure were observed throughout the thickness of both membranes. The average pore size of membrane derived from PALFs exhibited to be smaller than the hardwood which in turn affected the MFR and RR performances. Hence, based on the overall results, it can be concluded that PALFs as a non-wood plant can be utilized as one of the alternative sources for cellulose polymer in preparing the cellulosic microfiltration membranes.

Keywords: *membranes, cellulosic, pineapple leaf fibres (PALFs), hardwood, immersion precipitation*