Fabrication of loose inner-selective polyethersulfone (PES) hollow fibers by one-step spinning process for nanofiltration (NF) of textile dyes

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Abstract:

The development of a loose inner-selective polyethersulfone (PES) hollow fiber by one-step spinning process for nanofiltration (NF) has been demonstrated in this study. It is found that the addition of a small amount of sulfonated polysulfone (SPSf) and the use of a specially designed bore fluid made of hydrophilic additives such as polyethylene glycol (PEG) and polyvinylpyrrolidone (PVP) are of great importance to fabricate this type of NF membranes. Not only are they able to reduce the pore size but also suppress the formation of finger-like macrovoids. After optimizing both dope solution and spinning conditions, the as-fabricated membrane can have a 70 % rejection to PEG 1000 and a pure water permeability (PWP) of 12.8 $Lm^{-2}h^{-1}bar^{-1}$. Its rejection of indigo carmine (MW: 466 $gmol^{-1}$) can reach 96.64 %. In addition, it shows good stability in a continuous 76-hour operation with good efficiency of dye removal. The newly developed membrane may have great potential in the treatment of textile wastewater.

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