



The effect of PVDF concentration on PVDF/woven tube composite membranes and the application of composite membranes in SMBR

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ABSTRACT

Using fiber woven tube for support layer, the poly vinylidene fluoride (PVDF)/woven tube composite hollow fiber membrane with high strength and high water flux was prepared through the coating technology and immersion-precipitation technique. The effect of PVDF contents on membrane flux and porosity was investigated; using the homemade composite membrane in the sequencing batch membrane reactor (SMBR) reactor. The rejection effect on particles and the changes of the composite membrane performance were also studied. With the increase of PVDF concentration, pure water flux and the average pore diameter of the composite membrane decreased, but the burst pressure increased; the porosity increased at first and then decreased. In this research, porosity of composite membrane is always above 45%, the burst pressure is higher than 0.30 MPa, and the tensile strength of the composite membrane is very high. Although the membrane is operated at a high flux ($20 \pm 0.5 \text{ L m}^{-2} \text{ h}^{-1}$) in the SMBR system, the transmembrane pressure remains 5.5–6.5 kPa and the membrane permeability is up to $3.7 \text{ L m}^{-2} \text{ h}^{-1} \text{ kPa}^{-1}$. The study shows that the homemade composite hollow fiber membrane can be operated at a high flux and low pressure the membrane bioreactor. Furthermore, the composite membrane has a good ability to resist pollution and a high effect of particle rejection.

Keywords: Woven tube; Poly(vinylidene fluoride); Composite membrane; Membrane fouling

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