

Flux enhancement in a spiral wrap ultrafiltration element by using backpulsing

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Abstract:

The effect of backpulsing on the cross-flow ultrafiltration of dextrin in a spiral wrap module was investigated experimentally. Backpulsing experiments with dextrin solution were performed with a polysulfone membrane (100 000 MWCO). The dextrin feed concentration ranged from 0.25 to 0.75 g/ℓ, the cross-flow rate was between 500 and 1500 ℓ/h, the feed pressure was 100 kPa. The backpulsing involved of applying pressure pulses ranging from 100 to 150 kPa in the permeate space; the pulsing interval varied between 1 and 15 s and pulse duration varied between 0.1 and 0.5s.

Experimental results showed that backpulsing is effective in reducing membrane fouling and improving membrane flux. With continual backpulsing the net flux was found to increase with increasing backpulsing pressure, increase weakly with increasing cross-flow rate, and decrease strongly with increasing the dextrin concentration in the feed. The best result achieved was up to a four-fold increase in the steady state permeate flux compared with no backpulse (40% of the clean-membrane flux). This was obtained by backplusing at 0.1 s pulse duration, 3 s pulse interval and about 150 kPa backpulse pressure. The results also showed that about 60% of the flux could be maintained when replacing the foulant solution with clean water and backpulsing.

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