

## **Novel PVDF-HFP flat sheet membranes prepared by triethyl phosphate (TEP) solvent for direct contact membrane distillation**

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### **Abstract**

Poly(vinylidene fluoride-hexafluoropropylene) (PVDF-HFP) flat sheet membranes were prepared for aqueous membrane distillation (MD) applications using triethyl phosphate (TEP) as less-toxic solvent via phase inversion. PVDF-HFP concentrations of 10, 12 and 15 wt.% were investigated and it was observed that different polymer concentrations led to membranes with different surface structure and performance; the use of different coagulation bath compositions played a key role in the membrane fabrication and affected the performance in membrane distillation. The results showed that the permeation decreased sharply when the polymer concentration increased from 12 to 15 wt.%. By adding isopropanol as non-solvent to coagulation medium led to interesting results in terms of permeation. However, the use of lithium chloride to the casting solution had also a positive impact on membrane characteristics in price of retrograde membrane mechanical properties. Particularly interesting was the membrane produced from solution containing the 12 wt.% polymer and coagulated in the isopropanol–water mixture, which gave a DCMD permeation of  $16.1 \text{ kg h}^{-1} \text{ m}^{-2}$  at feed temperature of  $60 \text{ }^\circ\text{C}$ , and a salt rejection of 99.3%.

### **Keywords**

Flat sheet membranes; PVDF-HFP; Less-toxic solvent; TEP; Non-solvent induced phase separation; DCMD