Desalination and Water Treatment
www.deswater.com

doi: 10.5004/dwt.2017.20726

74 (2017) 96–104
May

Effect of MPD concentration in the coagulation bath on the performance of CTA flat-sheet FO membrane fabricated by CTA–NMP–TMC casting solution

Xue-Jiao Guo†, Ping-Yun Zhang†, Xiang-Yu Chi, Zhen-Liang Xu*, Yong-Di Liu

State Key Laboratory of Chemical Engineering, Membrane Science and Engineering R&D Lab, Chemical Engineering Research Center, East China University of Science and Technology, 130 Meilong Road, Shanghai 200237, China, Tel. +86-21-64253670; Fax: +86-21-64252989; emails: chemxuzl@ecust.edu.cn (Z.-L. Xu), 1442773036@qq.com (X.-J. Guo), muyige988122@163.com (P.-Y. Zhang), chemchixy@foxmail.com (X.-Y. Chi), ydliu@ecust.edu.cn (Y.-D. Liu)

Received 19 September 2016; Accepted 21 March 2017

ABSTRACT

In situ interfacial polymerization method was utilized to fabricate cellulose triacetate (CTA) forward osmosis (FO) flat-sheet membrane using CTA–*N*-methyl-2-pyrrolidone (NMP)–trimesoyl chloride (TMC) casting solution, non-woven fabric as the support layer and *m*-phenylenediamine (MPD) aqueous solution as the coagulation bath. It is believed that interfacial polymerization occurred synchronously with the precipitation process of the casting solution. On the one hand, the interfacial polymerization occurred on the both surfaces of the CTA's top and bottom; on the other hand, the in situ interfacial polymerization resulted in the polyamide selective separation layer throughout the whole bulk of resultant CTA FO membranes. One of the interesting results was that the permeability properties of FO and pressure retarded osmosis mode improved in terms of increased pure water flux and decreased reverse salt flux as the increasing concentration of the MPD in the coagulant. Besides, the permeability difference between the two modes was tiny. The other novel result was that the increased MPD concentration of the coagulant contributed to the decreased *S* value. In addition, the resultant CTA membranes had excellent rejection and improved hydrophilicity.

Keywords: Cellulose triacetate; Forward osmosis membranes; In situ polymerization

* Corresponding author.

† These authors contributed equally to this study.