Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Table S1. Electrospinning conditions for PVDF solution

Applied voltage (kV)	Flow rate (ml/h)	Distance (cm)	Temperature (°C)	Rotating speed (rpm)
22	1	17	24-26	300

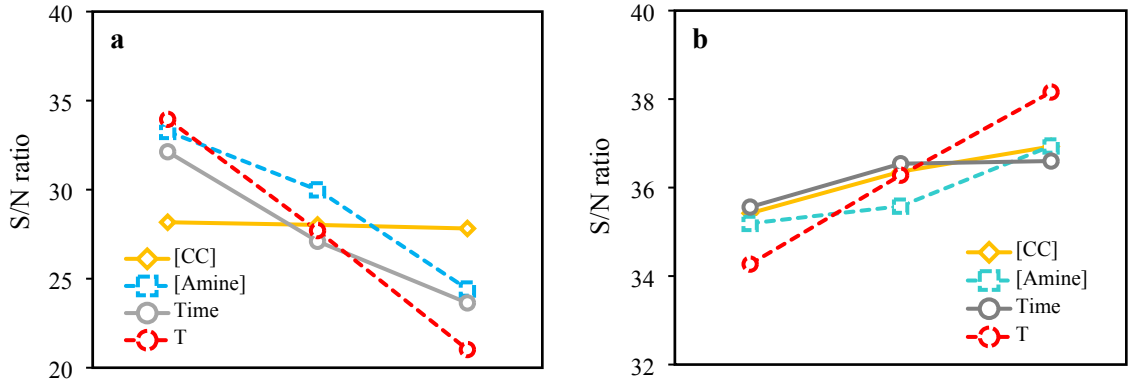

Figure S2. Effect of synthesis conditions on a) pure water flux and b) salt rejection of polyamine TFC membrane

The Overall Evaluation Criteria (OEC)

One of the most important purposes of using experimental design is optimization of responses in the desired value. Nonetheless, it is clear that the optimized condition toward attaining a high water flux will lead to a very low salt rejection and vice versa. Also as discussed above, because of the different effects of synthesis parameters on water flux and salt rejection, choosing the optimum synthesis conditions, on the basis of the obtained results from the separately investigated

effect of parameters won't be accurate. In order to optimize the overall performance of membrane, the water flux and salt rejection should be optimized simultaneously. However, the simultaneous optimization of these two responses won't be possible as their units of measurements are different. Unless the values of flux and rejection combined into a single index so they can be compared with one another. In such cases, an Overall Evaluation Criteria (OEC) is used which requires some adjustments to the formula combining the individual criteria of evaluations into a single quantity (1). The general formula of OEC is as followed:

$$OEC = \left[\frac{Yi - Yis}{Yib - Yis}\right] \times Wi + \left[1 - \frac{|Yj - Yjs|}{Yib - Yis}\right] \times Wj + \left[1 - \frac{|Yk - Ykm|}{Yib - Yis}\right] \times Wk$$

The terms of the OEC equation is defined in Table S3:

Table S3. The terms definition in OEC formula

Best value	Worst value	Relative weight	Quality characteristic	Responses
Y_{ib}	Y_{is}	Wi	Bigger is better	Yi
Y_{jb}	Y_{js}	Wj	Smaller is better	Yj
Y_{kb}	Y_{ks}	Wk	Nominal is better	Yk

Generally, to combine responses with different units of measurements, qualities, and relative weighting together, they must first be normalized, QC aligned and weighted accordingly. In case of membrane filtration, as the both of water flux and salt rejection are of importance, the relative weight of 50% assigned to each of them and the QC of both responses is "Bigger is better". The ANOVA results from OEC are presented in table S4.

Table S4. Analysis of variance based on OEC results

Response	Relative weight (%)	Control factors	DOF	Sum of Sqre.	Variance	Percent
Water flux & Rejection	50	[CC]	2	91.82	45.91	12.67%
		[PEHA]	2	83.47	41.73	11.51%
		Time	2	196.92	98.46	27.17%
	50	Temperature	2	352.40	176.2	48.63%
		Error	0	-	-	-

According to table 3, the contribution percent of synthesis factor in overall performance of membrane was as: Polymerization temperature > polymerization time > CC concentration > PEHA concentration, which has a different order from water flux or salt rejection.

1. Wangikar SS, Patowari PK, Misra RD. Parametric optimization for photochemical machining of copper using overall evaluation criteria. Mater Today Proc. 2018;5(2):4736–42.