**Transport in Reverse Osmosis Membranes: Observations and Comments on the Pore Flow Model versus the Solution‒Diffusion Model**

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**Supplementary Materials**

1. **Experimental method**

The contact angle measurements were conducted using commercial CTA-NW membranes from HTI. Prior to the measurement, membranes were rinsed with water to remove surface glycerin, then air-dried. The measurements were performed with a contact angle goniometer (DataPhysics, OCA 15Pro) using water with varying salinities (0, 1, 2, 3, 3.5 and 5 wt% NaCl) as the probe liquid. The membrane, with its active layer facing up, was carefully positioned on a flat platform using cellophane tape. For each measurement, a 0.5 microliter water droplet was placed on the membrane surface, followed by immediate measurement. The contact angle data presented together with the standard deviations in Table S1 are the averages of four measurements.

1. **Interpretation of the experimental data**

For a symmetric electrolyte, by using

 $a\_{\pm }=a^{1/2}$ (S1)

Equation (24) is written as

 $Γ=-\frac{αm}{2RT}\left(\frac{∂σ\_{sl}}{∂\left(αm\right)}\right)$ (S2)

Since

$σ\_{sl}=σ\_{sg}-$ $σ\cos(θ)$ (25)

and $σ\_{sg}$ is a constant

 $\frac{∂σ\_{sl}}{∂\left(αm\right)}=-\frac{∂\left(σ\cos(θ)\right)}{∂\left(αm\right)}$ (S3)

From Equations (S2) and (S3)

 $Γ=\frac{αm}{2RT}\left(\frac{∂\left(σ\cos(θ)\right)}{∂\left(αm\right)}\right)$ (S4)

Table S2 summarizes $Γ$ values calculated by Equation (S4).

Table S1. Average contact angle and standard deviation

|  |  |  |
| --- | --- | --- |
| NaCl concentration, wt.% | Average contact angle, *θ* o | Standard deviation, o |
|  0 | 52.53 | 5.74 |
| 1 | 55.14 | 3.60 |
| 2 | 59.24 | 1.98 |
| 3 | 56.79 | 1.08 |
| 3.5 | 60.45 | 5.11 |
| 5 | 63.08 | 3.66 |

Table S2.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NaCl concentration, wt.% | NaClMolality (*m*),mol/1000 g | Activity coefficient, $α$ | Activity, $αm,$mol/1000 g | Surface tension × 103, *σ*, N/m | $σ\cos(θ×10^{3})$,N/m | Surface excess*a*, *Γ* × 106, mol/m2 |
| 0 | 0 | 1 | 0 | 72.83 | 44.31 | 0 |
| 1 | 0.173 | 0.786 | 0.136 | 73.12 | 41.79 | -0.462 |
| 2 | 0.349 | 0.720 | 0.251 | 73.41 | 37.55 | -0.852 |
| 3 | 0.529 | 0.686 | 0.363 | 73.71 | 40.37 | -1.232 |
| 3.5 | 0.621 | 0.679 | 0.422 | 73.87 | 36.43 | -1.432 |
| 5 | 0.901 | 0.659 | 0.594 | 74.34 | 33.66 | -2.016 |

*a* *Γ* was obtained by equation (S4) with $\frac{∂σ\cos(θ)}{∂αm}=-16.83×10^{-3}$