

Removal of trihalomethanes precursors by nanofiltration in low SUVA drinking water.

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Supplementary Material

Table S1: Membrane specification.

Membrane	Manufacturer (Model)	Polymer structure	Molecular Weight Cutoff [Da]	Active area [m ²]	pH range	Permeability* (L h ⁻¹ m ⁻² bar ⁻¹)
NF DL	GE-OSMONICS (2540F1072)	thin film	150–300	2.5	3–9	4.81±0.13
NF 270	DOW (NF-90-2540)	polyamide thin film	150 ^a , 200 ^b , 500 ^f	2.6	2–11	10.16±0.14
NF 90	DOW (NF-270-2540)	polyamide thin film	200 ^{d,f} , 300 ^e	2.6	2–11	6.80±0.07

Information according to suppliers. ^a[1], ^b [2], ^d[3], ^e [4], ^f [5].

** Permeability was measured in present study with distilled water (RO permeate) as feed under different pressures between 3-10 bar.*

Table S2: Characteristics of NWC water (after the central filtration plant at Eshkol site, where our water samples were taken).

	Value range	Average (S.D)	Median
Turbidity [NTU]^a	0.1-0.2	0.15 (0.04)	0.14
DOC [mg/L]^b	2.4-3.9	2.97 (0.4)	2.82
UVA₂₅₄ [1/cm]^a	0.018-0.023	0.02 (0.001)	0.02
Alk [mg/L as CaCO₃]^a	98-142	113 (10)	111
Hardness [mg/L as CaCO₃]^b	276-318	298 (13.5)	300
TTHMF (SDS) [µg/L]^b			
Winter	47-77	62 (9)	61
Spring/Summer	63-139	91 (19)	83
TTHMFP [µg/L]^b			
Winter	91-197	125 (32)	116
Spring/Summer	125-218	163 (25)	156
Ca²⁺ [mg/l]^a	47-58	51 (4)	50
Mg²⁺ [mg/l]^a	29-34	32 (2)	31.9
Cl⁻ [mg/l]^b	300-380	345 (20)	349
pH^a	7.1-8.4	7.8 (0.2)	7.8

^a- "MEKOROT" – National Israel Water Company. ^b Present study.

Table S3: Measurements of DOC, UVA₂₅₄, TTHMF and TTHMFP in feed and permeates, as a function of membrane type and feed pressure.

NDP	Membrane	DOC [mg/l]	UVA ₂₅₄ [1/cm]	TTHMF [µg/l]	TTHMFP [µg/l]
Feed	NF270	3.1±0.4	0.026±0.002	120±36	177±24
	NF90	3.0±0.6	0.023±0.002	75±2	149±19
	DL	3.6±0.2	0.021±0.0007	81±17	177±17
3	NF270	0.4±0.1	0.002±0.0004	24±10	26±2
	NF90	0.6±0.1	0.002±0.0009	13±2	22±9
	DL	0.8±0.2	0.006±0.001	28±6	42±5
5	NF270	0.4±0.1	0.001±0.0003	20±4	29±6
	NF90	0.6±0.2	0.001±0.0009	8±1	17±3
	DL	0.7±0.2	0.003±0.001	26±7	38±10
10	NF270	0.4±0.1	0.001±0.0005	22±4	25±6
	NF90	0.5±0.3	0.001±0.0006	7±0.4	21±7
	DL	0.8±0.1	0.002±0.001	25±4	40±9

Table S4: Measurements of DOC, UVA₂₅₄, TTHMF and TTHMFP in feed and permeates, as a function of membrane type and water recovery.

Recovery [%]	Membrane	DOC [mg/l]	UVA ₂₅₄ [1/cm]	TTHMF [µg/l]	TTHMFP [µg/l]
Feed	NF270	3.3±0.5	0.026±0.004	108±23	189±18
	NF90	2.8±0.2	0.025±0.001	74±7	147±7
	DL	2.8±0.2	0.020±0.0009	57±9	110±13
0	NF270	0.4±0.1	0.001±0.0003	20±4	29±6
	NF90	0.6±0.2	0.001±0.0009	8±1	17±3
	DL	0.8±0.2	0.006±0.001	28±6	42±5
20	NF270	0.5±0.1	0.001±0.0009	30±11	30±12
	NF90	0.3±0.1	0.0005±0.0003	8±2	13±3
	DL	0.6±0.1	0.006±0.0006	34±3	33±2
50	NF270	0.8±0.4	0.002±0.0007	34±15	38±9
	NF90	0.4±0.2	0.002±0.001	11±3	23±7
	DL	0.5±0.1	0.006±0.0006	22±5	35±10
70	NF270	0.8±0.1	0.002±0.0006	31±5	34±11
	NF90	0.8±0.5	0.004±0.002	17±7	27±8
	DL	0.8±0.3	0.007±0.0005	27±6	42±4
85	NF270	0.8±0.5	0.003±0.001	47±11	64±19
	NF90	1.01±0.06	0.003±0.001	17±6	45±6
	DL	-	-	-	-

Table S5: Inorganic parameter (Conductivity, Hardness, Ca⁺², Mg⁺², Cl⁻) average rejections as a function of pressure (water recovery close to zero).

		Average rejection (R) [%]			
NDP	Membrane	Conductivity	Ca⁺²	Mg⁺²	Cl⁻
3	NF 270	54.1±3	77.2±3	89.4±3	38.5±4
	NF90	97.5±0.4	96.4±1	96±2	85.8±2
	DL	20.2±6	33.1±11	32.8±7	4.8±5
5	NF 270	60.8±5	79±3	91.6±1	46±6
	NF90	98.6±0.3	97.7±1	98±2	86.5±2
	DL	28.5±5	51.2±6	46.3±5	14.2±11
10	NF 270	65.4±3	81.8±4	93.1±4	50.1±5
	NF90	98.9±0.1	98.4±2	99±1	86.9±2
	DL	40.9±5	65.1±6	59.8±2	25.1±7

Table S6: Inorganic parameter (Conductivity, Hardness, Ca⁺², Mg⁺², Cl⁻) average rejections as a function of water recovery (P=3 bars).

		R average [%]			
Recovery [%]	Membrane	Conductivity	[Ca ⁺²]	[Mg ⁺²]	[Cl ⁻]
0	NF 270	60.8±5	79±3	91.6±1	46±6
	NF90	98.6±0.3	97.7±1	98±2	86.5±2
	DL	20.2±5	33.1±11	32.8±7	4.8±5
20	NF 270	56.5±1	82.8±3	93.5±1	44.1±2
	NF90	97.6±0.1	97.9±1	99.5±1	84.5±1
	DL	14.7±1	22.3±7	26.5±2	(-0.4)±2
50	NF 270	51.5±0.4	80.1±2	91.7±1	38.9±2
	NF90	97.3±0.3	97.8±1	99.7±1	84±0.3
	DL	19.3±3	30.7±2	27.4±2	10.5±2
70	NF 270	47.9±0.3	75.5±2	91.1±2	34.4±2
	NF90	96.8±0.4	98.1±1	99.7±1	84±1
	DL	11.8±0.3	20.4±4	24.9±2	1.3±1
85	NF 270	43.3±1	71.8±4	87.1±3	30.1±1
	NF90	96.2±0.1	96.9±1	99.4±1	82.4±3

Table S7: synthetic solution organic average rejection in NF90, NF 270 and DL.

	R[%]			
	DOC	UVA254	TTHMF	TTHMFP
NF-270	85.4±0.2	99.5±0.1	73.1±3.3	88.6±3.1
NF-90	NA	99.6±0.1	87±2	95.5±0.3
DL	86.7±0.6	99.5±0.05	80.1±2.1	90.3±1.4

*NA- result not available due to sample contamination during DOC analysis.

References

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