

Supporting Information

Removal of membrane fouling and control of halogenated by-products by a combined cleaning process with peroxides and sodium hypochlorite

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Table S1. Sensitivities of the determination methods for various halogenated by-products.

By-products	Abbreviation	Fortified Concentration ($\mu\text{g/L}$)	Observed Concentration ($\mu\text{g/L}$)	Average recovery (%)	RSD (%)	MDL ($\mu\text{g/L}$)	LCL ($\mu\text{g/L}$)	UCL ($\mu\text{g/L}$)
Chloroform	TCM	5.00	4.857	97.1	6.21	0.851	0.587	1.558
Trichloroacetonitrile	TCAN	0.40	0.387	97.1	4.44	0.049	0.034	0.089
Trichloroethylene	TCE	0.40	0.414	103.4	4.10	0.048	0.033	0.088
Chloral hydrate	CH	0.50	0.502	100.5	3.66	0.052	0.036	0.095
Dichloroacetonitrile	DCAN	0.40	0.408	103.0	3.80	0.044	0.030	0.081
1,1-dichloro-2-propanone	1,1-DCP	0.40	0.408	101.3	5.60	0.064	0.044	0.117
Trichloronitromethane	TCNM	0.40	0.407	101.8	6.50	0.075	0.052	0.137
1,1,1-trichloro-2-propanone	TCP	0.40	0.438	109.6	5.48	0.068	0.047	0.124
Monochloroacetic acid	MCAA	1.00	1.142	114.2	7.41	0.239	0.165	0.437
Dichloroacetic acid	DCAA	1.00	1.192	119.2	13.09	0.440	0.304	0.805
Trichloroacetic acid	TCAA	1.00	1.067	106.7	18.06	0.543	0.375	0.995

Note: 1) The USEPA method for establishing detection limits was applied; 2) each of halogenated by-products was determined in 10 aliquots; 3) the LCL and UCL are the lower and upper 95% confidence limits, respectively, based on 10 aliquots; 4) RSD is the relative standard deviation.

Table S2. Correlation analysis between different by-product generation and cleaning time

	Time	TCM	CH	DCAN	DCP	TCNM	TCP	MCAA	DCAA	TCAA
Time	1	0.947	0.982*	0.924	0.903	0.896	0.969*	0.569	0.937	0.926
TCM		1	0.988*	0.978*	0.988*	0.897	0.997**	0.573	0.944	0.927
CH			1	0.977*	0.954*	0.882	0.994**	0.529	0.933	0.916
DCAN				1	0.942	0.789	0.970*	0.389	0.859	0.833
DCP					1	0.921	0.979*	0.654	0.954*	0.941
TCNM						1	0.914	0.866	0.992**	0.997**
TCP							1	0.594	0.957*	0.942
MCAA								1	0.798	0.824
DCAA									1	0.999**
TCAA										1

Note: **Indicates significant correlation at 0.01 level, * indicates significant correlation at 0.05 level.

Table S3. Correlation analysis between different by-product generation and cleaning temperature

	Temp.	TCM	CH	DCAN	DCP	TCNM	TCP	MCAA	DCAA	TCAA
Temp.	1	0.967	0.925	0.991	0.484	-0.934	0.973	0.707	0.756	0.833
TCM		1	0.991	0.923	0.245	-0.812	0.883	0.504	0.565	0.666
CH			1	0.864	0.114	-0.727	0.812	0.384	0.449	0.560
DCAN				1	0.599	-0.974	0.996	0.797	0.838	0.901
DCP					1	-0.765	0.672	0.961	0.939	0.887
TCNM						1	-0.991	-0.913	-0.940	-0.976
TCP							1	0.851	0.886	0.938
MCAA								1	0.997*	0.980
DCAA									1	0.992
TCAA										1

Note: **Indicates significant correlation at 0.01 level, * indicates significant correlation at 0.05 level.

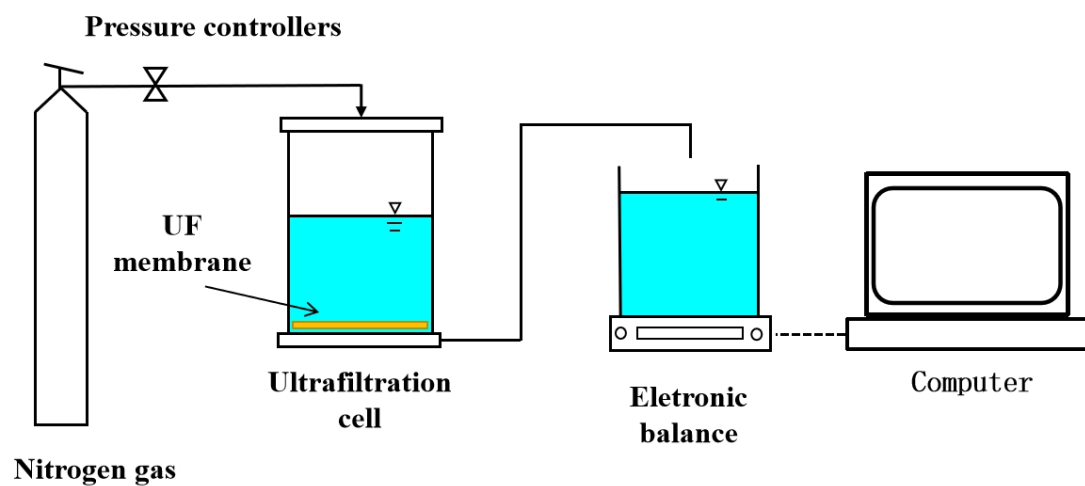


Figure. S1. Schematic diagram of UF system experimental set-up.