Electronic Supplementary Material (ESI) for Environmental Science: Processes & Impacts.

Supplementary Information for

Ozone, hydrogen peroxide, and peroxymonosulfate disinfection of MS2 coliphage in water

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Number of pages: 11 (including cover sheet)

Number of texts: 1

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Text S1. The oxidant demand of the disinfection system

0.1 mM, 1 mM PMS, and 50 mM H_2O_2 were respectively added into the disinfection system without MS2 coliphage (5 mM PBS and coliphage MS2 liquid medium), The concentration of oxidants did not change significantly. The nutrient composition of the coliphage MS2 liquid medium was shown in Table.S1, and it was thousand-fold diluted before the oxidant was added (the diluted concentration: <10.0 mg/L tryptone, <10.0 mg/L yeast extract, <8.0 mg/L sodium chloride).

Table S1. The component list of Coliphage MS2 liquid medium

Tutrition	**Concentration (g/L)**
tryptone	10.0
yeast extract	1.0
sodium chloride	8.0

Table S2. Water quality parameters of the secondary effluent

pH	TOC（mg-C/L）	NH_3-N(mg/L)	Turbidity (NTU)
7.92	6.650	0.22	3.19

Table S3. Five regions and typical organics of EEM[1]

Emission (nm)	**Excitation (nm)**	**Region**	**Typical organics**
220-250	280-330	I	Aromatic protein I
220-250	330-380	II	Aromatic protein II
220-250	380-500	III	Fulvic acid-like materials
250-280	280-380	IV	Soluble microbial metabolites
250-400	380-500	V	Humic acid-like organics

Table S4. The disinfection performance of oxidants in different conditions

Disinfectant	Water	Dose (mM)	Time (min)	Log(N/N$_0$)
O_3	Ultrapure Water	0.005	30	0.89±0.06
	Ultrapure Water	0.03	30	1.25±0.11
	Ultrapure Water	0.05	30	3.90±0.02
	Ultrapure Water	0.1	0.5	4.59±0.29
	Ultrapure Water	0.1	1	4.51±0.12
	Ultrapure Water	0.1	3	4.55±0.40
	Ultrapure Water	0.1	5	4.36±0.13
	Ultrapure Water	0.1	10	4.41±0.09
	Ultrapure Water	0.1	15	5.10±0.10
	Ultrapure Water	0.1	30	5.21±0.38
	Secondary Effluent	0.1	30	4.32±0.24
	Ultrapure Water	0.25	30	6.88
PMS	Ultrapure Water	0.01	30	0.87±0.06
	Ultrapure Water	0.1	30	1.94±0.14
	Ultrapure Water	0.25	30	2.25±0.11
	Ultrapure Water	1	30	4.30±0.02
	Ultrapure Water	1	0.5	1.84±0.04
	Ultrapure Water	1	1	1.85±0.05
	Ultrapure Water	1	3	1.98±0.04
	Ultrapure Water	1	5	2.23±0.10
	Ultrapure Water	1	10	3.14±0.11
	Ultrapure Water	1	15	3.46±0.02
	Ultrapure Water	1	30	5.01±0.21
	Ultrapure Water	1	30	5.13±0.17
	Secondary Effluent	1	30	4.44±0.21
	Ultrapure Water	2.5	30	6.29±0.71
H_2O_2	Ultrapure Water	1	30	0.76±0.02
	Ultrapure Water	2.5	30	1.09±0.01
	Ultrapure Water	5	30	2.35±0.12
	Ultrapure Water	10	30	2.95±0.01
	Ultrapure Water	25	30	4.48±0.12
	Ultrapure Water	50	0.5	3.20±0.03
	Ultrapure Water	50	1	3.27±0.14
	Ultrapure Water	50	3	4.61±0.36
	Ultrapure Water	50	5	4.83±0.16
	Ultrapure Water	50	10	4.87±0.25
	Ultrapure Water	50	15	5.21±0.06
	Ultrapure Water	50	30	5.36±0.22
	Secondary Effluent	50	30	4.04±0.16
	Ultrapure Water	100	30	6.12±0.71

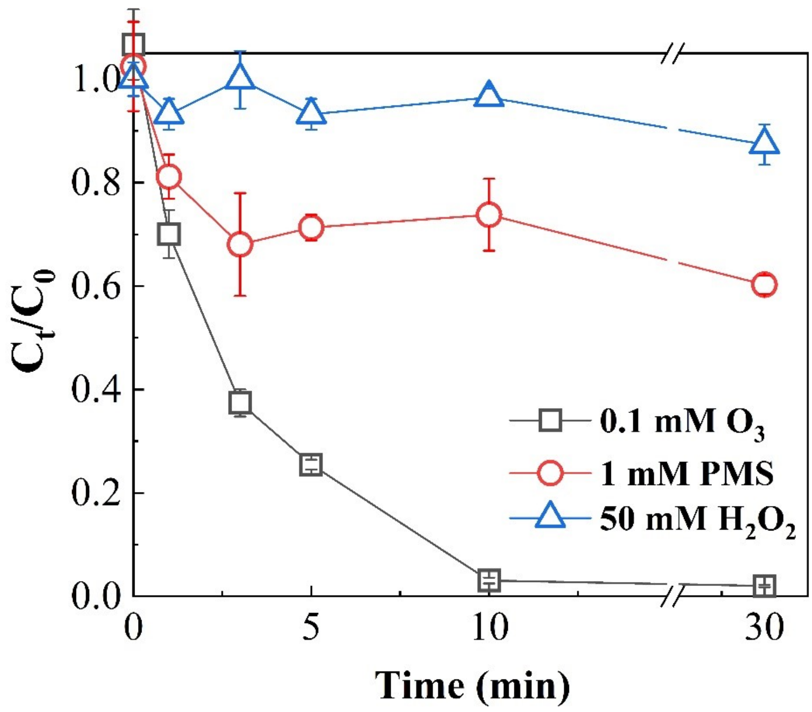

Figure S1. The decay of oxidants within 30 min in the DI water

Figure S2. The decay of oxidants within 30 min in the secondary effuent

Reference

[1] Chen, W., Westerhoff, P., Leenheer, J.A. and Booksh, K. 2003. Fluorescence Excitation−Emission Matrix Regional Integration to Quantify Spectra for Dissolved Organic Matter. Environmental Science & Technology 37(24), 5701-5710.