SUPPLEMENTARY MATERIAL

Table SI. MP occurrence in water.

Local	Polymer	Size (µm)	Concentration (MP/m³)	Type	Ref.
China	PE	>1	1.10E+04	Drinking water	(Shen et al. 2021)
China	PET	>1	9.09E+03		
China	PP	>1	6.25E+03		
China	PVC	>1	8.77E+03		
China	PA	>1	1.75E+03		
China	Others	>1	7.01E+03		
China	PE	>1	8.11E+04	Drinking water	
China	PP	>1	4.73E+04		
China	PET	>1	8.45E+04		
China	PVC	>1	2.03E+04		
China	PA	>1	1.18E+04		
China	Others	>1	9.30E+04		
China	PE	>1	8.59E+04	Drinking water	
China	PET	>1	7.13E+04		
China	PP	>1	4.89E+04		
China	PVC	>1	6.87E+04		
China	PA	>1	1.37E+04		
China	Others	>1	5.50E+04		
China	PE	>1	8.45E+04	Drinking water	
China	PP	>1	4.93E+04		
China	PET	>1	8.80E+04		
China	PVC	>1	2.11E+04		
China	PA	>1	1.23E+04		
China	Others	>1	9.68E+04		
China	PE	>1	9.60E+04	Drinking water	(Shen et al. 2021)
China	PP	>1	5.60E+04		
China	PET	>1	1.00E+05		
China	PVC	>1	2.40E+04		
China	PA	>1	1.40E+04		
China	Others	>1	1.10E+05		

Table SI. Continuation.

China	PE	>1	1.01E+05	Drinking water	(Shen et al. 2021)
China	PET	>1	8.38E+04		
China	PP	>1	5.76E+04		
China	PVC	>1	8.08E+04		
China	PA	>1	1.62E+04		
China	Others	>1	6.46E+04		
China	PE	>1	5.82E+05	Drinking water	
China	PP	>1	2.87E+05		
China	PS	>1	3.59E+05		
China	PET	>1	3.50E+05		
China	PMMA	>1	9.45E+04		
China	PVC	>1	1.59E+05		
China	PA	>1	1.41E+05		
China	Others	>1	2.01E+05		
China	PE	>1	7.38E+05	Drinking water	
China	PP	>1	3.63E+05		
China	PS	>1	4.54E+05		
China	PET	>1	4.43E+05		
China	PMMA	>1	1.20E+05		
China	PVC	>1	2.01E+05		
China	PA	>1	1.79E+05		
China	Others	>1	2.55E+05		
China	PE	>1	1.07E+06	Drinking water	(Shen et al. 2021)
China	PP	>1	5.28E+05		
China	PS	>1	6.60E+05		
China	PET	>1	6.44E+05		
China	PMMA	>1	1.74E+05		
China	PVC	>1	2.92E+05		
China	PA	>1	2.60E+05		
China	Others	>1	3.70E+05		
Greenland	PE	1660	9.89E-01	Sub-surface water	(Morgana et al. 2018)
Greenland	PP	1660	5.64E-01		
Greenland	PVC	1660	2.83E-01		
Greenland	Others	1660	5.64E-01		
Iran	PP	2650	5.64E-01	Surface water	(Rasta et al. 2021)
Iran	PE	2650	4.03E-01		
Iran	Others	2650	4.03E-01		

Table SI. Continuation.

Malaysia	PA	650	3.35E+02	Surface water	(Zaki et al. 2021)
Malaysia	PE	650	2.50E+01		
Malaysia	Others	650	1.40E+02		
Malaysia	PA	650	3.02E+03	Surface water	
Malaysia	PE	650	2.25E+02		
Malaysia	Others	650	1.26E+03		
Nepal		<1000		Surface water	(Malla-Pradhan et al. 2022)
Nepal				Surface water	
China	PE	300	1.40E+01	Surface water	(Xiong et al. 2021)
China	PP	300	3.65E+01		
China	PET	300	3.00E+01		
China	PS	300	1.30E+00		
China	PA	300	3.88E+00		
China	PVC	300	1.30E+00		(Xiong et al. 2021)
China	PE	300	1.88E+01	Surface water	
China	PP	300	4.91E+01		
China	PET	300	4.04E+01		
China	PS	300	1.74E+00		
China	PA	300	5.22E+00		
China	PVC	300	1.74E+00		
China	PE	300	8.57E+01	Surface water	
China	PP	300	2.24E+02		
China	PET	300	1.84E+02		
China	PS	300	7.94E+00		
China	PA	300	2.38E+01		
China	PVC	300	7.94E+00		
China	PE	300	1.21E+02	Surface water	
China	PP	300	3.15E+02		
China	PET	300	2.59E+02		
China	PS	300	1.12E+01		
China	PA	300	3.35E+01		
China	PVC	300	1.12E+01		
China	PE	>1000	1.40E+01	Surface water	
China	PP	>1000	3.65E+01		
China	PET	>1000	3.00E+01		
China	PS	>1000	1.30E+00		
China	PA	>1000	3.88E+00		

Table SI. Continuation.

China	PVC	>1000	1.30E+00	Surface water	(Xiong et al. 2021)
China	PE	>1000	1.88E+01		
China	PP	>1000	4.91E+01		
China	PET	>1000	4.04E+01		
China	PS	>1000	1.74E+00		(Xiong et al. 2021)
China	PA	>1000	5.22E+00		
China	PVC	>1000	1.74E+00		
China	PE	>1000	8.57E+01	Surface water	
China	PP	>1000	2.24E+02		
China	PET	>1000	1.84E+02		
China	PS	>1000	7.94E+00		
China	PA	>1000	2.38E+01		
China	PVC	>1000	7.94E+00		
China	PE	>1000	1.21E+02	Surface water	
China	PP	>1000	3.15E+02		
China	PET	>1000	2.59E+02		
China	PS	>1000	1.12E+01		
China	PA	>1000	3.35E+01		
China	PVC	>1000	1.12E+01		
Germany	Acrylates/PUR/ Varnish	255,5	1.53E+01	Surface water	(Roscher et al. 2021)
Germany	Ruber type 3	255,5	2.25E+00		
Germany	PP	255,5	1.38E+00		
Germany	Others	255,5	4.03E+00		
Germany	Acrylates/PUR/ Varnish	255,5	6.47E+03	Surface water	
Germany	Ruber type 3	255,5	9.51E+02		
Germany	PP	255,5	5.82E+02		
Germany	Others	255,5	1.70E+03		
Finland	PE	235	2.00E+02	Surface water	(Viitala et al. 2022)
Finland	PS	235	1.00E+02		
Finland	PP	235	3.00E+02		
Finland	PE	235	2.00E+02	Surface water	(Viitala et al. 2022)
Finland	PS	235	1.00E+02		
Finland	PP	235	8.00E+02		
Finland	PE	235	2.00E+02		
Finland	PS	235	1.00E+02		
Finland	PP	235	1.00E+02		

Table SI. Continuation.

Finland	PE	235	2.00E+02	Surface water	(Viitala et al. 2022)
Finland	PS	235	1.00E+02		
Finland	PP	235	2.00E+02		
Finland	PE	235	2.00E+02	Surface water	
Finland	PS	235	1.00E+02		
Finland	PP	235	6.00E+02		
Finland	PE	235	1.00E+02	Surface water	
Finland	PS	235	1.00E+02		
Finland	PP	235	3.00E+02		
Finland	PE	235	1.00E+02	Surface water	
Finland	PS	235	1.00E+02		
Finland	PP	235	8.00E+02		
Finland	PE	235	1.00E+02	Surface water	
Finland	PS	235	1.00E+02		
Finland	PP	235	1.00E+02		
Finland	PE	235	1.00E+02	Surface water	
Finland	PS	235	1.00E+02		
Finland	PP	235	2.00E+02		
Finland	PE	235	1.00E+02	Surface water	
Finland	PS	235	1.00E+02		
Finland	PP	235	6.00E+02		
South Africa	PE	750	8.79E+02	Surface water	(Apetogbor et al. 2023)
South Africa	Cotton	750	4.54E+02		
South Africa	PP	750	1.02E+02		
South Africa	PET	750	8.54E+01		
South Africa	PE	750	2.97E+03	Surface water	
South Africa	Cotton	750	1.53E+03		
South Africa	PP	750	3.43E+02		
South Africa	PET	750	2.88E+02		
Pakistan	PE	200		Surface water	(Bashir & Hashmi 2022)
Pakistan	PE	200		Surface water	
India	PE	2320	1.54E+03	Surface water	(Selvam et al. 2021)
India	Nylon	2320	9.80E+02		
India	PEST	2320	2.80E+02		
United States		>500		Surface water	(Leads & Weinstein 2019)
United States		>500		Surface water	

Table SI. Continuation.

Iran	PP	1500	3.38E-01	Surface water	(Rasta et al. 2020)
Iran	PE	1500	2.71E-01		
Iran	Others	1500	2.71E-01		
Iran	PP	1500	8.25E-01	Surface water	
Iran	PE	1500	4.12E-01		
Iran	Others	1500	1.03E-01		
Iran	PP	1500	7.38E-01	Surface water	(Rasta et al. 2020)
Iran	PE	1500	5.91E-01		
Iran	Others	1500	5.91E-01		
Iran	PP	1500	9.91E-01	Surface water	
Iran	PE	1500	4.95E-01		
Iran	Others	1500	1.24E-01		
Iran	PP	1500	8.42E-01	Surface water	
Iran	PE	1500	6.74E-01		
Iran	Others	1500	6.74E-01		
Iran	PP	1500	6.40E-01	Surface water	
Iran	PE	1500	3.20E-01		
Iran	Others	1500	8.02E-02		
Iran	PP	1500	1.54E-01	Surface water	
Iran	PE	1500	1.23E-01		
Iran	Others	1500	1.23E-01		
Iran	PP	1500	1.17E-01	Surface water	
Iran	PE	1500	5.84E-02		
Iran	Others	1500	1.46E-02		
Iran	PP	1500	1.70E+00	Surface water	
Iran	PE	1500	1.36E+00		
Iran	Others	1500	1.36E+00		
Iran	PP	1500	1.75E+00	Surface water	
Iran	PE	1500	8.77E-01		
Iran	Others	1500	2.20E-01		
Iran	PP	1500	3.23E-01	Surface water	(Rasta et al. 2020)
Iran	PE	1500	2.58E-01		
Iran	Others	1500	2.59E-01		
Iran	PP	1500	2.95E-01	Surface water	(Rasta et al. 2020)
Iran	PE	1500	1.48E-01		
Iran	Others	1500	3.70E-02		

Table SI. Continuation.

China	PE	510	1.80E+02	Surface water	(Lin et al. 2018)
China	PP	510	9.93E+01		
China	Others	510	9.93E+01		
China	PE	510	3.77E+03	Surface water	
China	PP	510	2.08E+03		
China	Others	510	2.08E+03		
South Korea	Silicone	2550	0.00E+00	Surface water	(Park et al. 2020)
South Korea	PS	2550	0.00E+00		
South Korea	PP	2550	0.00E+00		
South Korea	PEST	2550	0.00E+00		
South Korea	Others	2550	0.00E+00		
South Korea	Silicone	2550	9.91E+00	Surface water	
South Korea	PS	2550	7.25E+00		
South Korea	PP	2550	6.61E+00		
South Korea	PEST	2550	5.92E+00		
South Korea	Others	2550	1.32E+01		
South Korea	PTFE	2550	1.56E+01	Surface water	
South Korea	Rayon	2550	6.36E+00		
South Korea	PE	2550	5.73E+00		
South Korea	PVC	2550	4.29E+00		
South Korea	PP	2550	3.82E+00		
South Korea	Others	2550	3.24E+00		
South Korea	PTFE	2550	9.36E+01	Surface water	(Park et al. 2020)
South Korea	Rayon	2550	3.82E+01		
South Korea	PE	2550	3.45E+01		
South Korea	PVC	2550	2.58E+01		
South Korea	PP	2550	2.30E+01		
South Korea	Others	2550	1.95E+01		
Mexico	PP	375		Surface water	(Ramírez-Álvarez et al. 2020)
Mexico	PE	375			
Mexico	PE-PDM	375			

Table SI. Continuation.

China	PP	3500	6.43E+03	Surface water	(Wang et al. 2020)
China	PET	3500	3.72E+03		
China	Others	3500	1.09E+04		
China	PP	3500	1.50E+04	Surface water	
China	PET	3500	8.67E+03		
China	Others	3500	2.53E+04		
China	PP	1500	6.43E+03	Surface water	
China	PET	1500	3.72E+03		
China	Others	1500	1.09E+04		
China	PP	1500	1.50E+04	Surface water	
China	PET	1500	8.67E+03		
China	Others	1500	2.53E+04		
China	PP	650	6.43E+03	Surface water	
China	PET	650	3.72E+03		
China	Others	650	1.09E+04		
China	PP	650	1.50E+04	Surface water	
China	PET	650	8.67E+03		
China	Others	650	2.53E+04		
China	PP	200	6.43E+03	Surface water	
China	PET	200	3.72E+03		
China	Others	200	1.09E+04		
China	PP	200	1.50E+04	Surface water	
China	PET	200	8.67E+03		
China	Others	200	2.53E+04		
China	PP	<100	6.43E+03	Surface water	(Wang et al. 2020)
China	PET	<100	3.72E+03		
China	Others	<100	1.09E+04		
China	PP	<100	1.50E+04	Surface water	
China	PET	<100	8.67E+03		
China	Others	<100	2.53E+04		
Arctic	PE	300	3.01E+00	Surface water	(Carlsson et al. 2021)
Arctic	PP	300	2.45E-01		
Arctic	Others	300	2.45E-01		
China	PET	290	1.43E+04	Surface water	(Chen et al. 2020)
China	PE	290	1.34E+04		
China	Others	290	5.52E+02		

Table SI. Continuation.

China	PET	2000	1.43E+04	Surface water	(Chen et al. 2020)
China	PE	2000	1.34E+04		
China	Others	2000	5.52E+02		
China	PET	750	1.43E+04	Surface water	
China	PE	750	1.34E+04		
China	Others	750	5.52E+02		
China	PET	290	1.58E+04	Surface water	
China	PE	290	1.56E+03		
China	PE+PP	290	1.57E+03		
China	PUF	290	3.16E+03		
China	PP	290	3.45E+03		
China	Others	290	6.68E+02		
China	PET	750	1.58E+04	Surface water	
China	PE	750	1.56E+03		
China	PE+PP	750	1.57E+03		
China	PUF	750	3.16E+03		
China	PP	750	3.45E+03		
China	Others	750	6.68E+02		
China	PET	2000	1.58E+04	Surface water	
China	PE	2000	1.56E+03		
China	PE+PP	2000	1.57E+03		
China	PUF	2000	3.16E+03		
China	PP	2000	3.45E+03		
China	Others	2000	6.68E+02		
China	PET	290	1.07E+04	Surface water	(Chen et al. 2020)
China	PE+PP	290	1.16E+03		
China	PP	290	1.14E+03		
China	PA	290	1.04E+03		
China	Others	290	3.17E+02		
China	PET	750	1.07E+04	Surface water	
China	PE+PP	750	1.16E+03		
China	PP	750	1.14E+03		
China	PA	750	1.04E+03		
China	Others	750	3.17E+02		
China	PET	2000	1.07E+04		
China	PE+PP	2000	1.16E+03		
China	PP	2000	1.14E+03		

Table SI. Continuation.

China	PA	2000	1.04E+03	Surface water	(Chen et al. 2020)
China	Others	2000	3.17E+02		
Canada		<60		Surface water	(Vermaire et al. 2017)
Canada		<60		Surface water	
Canada		<60		Surface water	
Canada		<60		Wastewater	
Canada		<60		Wastewater	
Canada	PE	89	1.49E+00	Surface water	(Bujaczek et al. 2021)
Canada	PP	89	4.05E-01		
Canada	Others	89	2.70E+00		
Canada	PE	89	8.49E+00	Surface water	
Canada	PP	89	2.31E+00		
Canada	Others	89	1.54E+01		
Canada	PE	89	2.86E+01	Surface water	
Canada	PP	89	7.77E+00		
Canada	Others	89	5.19E+01		
Canada	PE	187,5	3.09E+01	Surface water	
Canada	PP	187,5	8.40E+00		
Canada	Others	187,5	5.62E+01		
Canada	PE	187,5	8.49E+00	Surface water	
Canada	PP	187,5	2.31E+00		
Canada	Others	187,5	1.54E+01		
Canada	PE	187,5	2.86E+01	Surface water	(Bujaczek et al. 2021)
Canada	PP	187,5	7.77E+00		
Canada	Others	187,5	5.19E+01		
Canada	PE	375	4.45E+01	Surface water	
Canada	PP	375	1.21E+01		
Canada	Others	375	8.08E+01		
Canada	PE	375	8.49E+00	Surface water	
Canada	PP	375	2.31E+00		
Canada	Others	375	1.54E+01		
Canada	PE	375	2.86E+01	Surface water	
Canada	PP	375	7.77E+00		
Canada	Others	375	5.19E+01		
Canada	PE	750	5.81E+01		
Canada	PP	750	1.58E+01		

Table SI. Continuation.

Canada	Others	750	1.05E+02		(Bujaczek et al. 2021)
Canada	PE	750	8.49E+00	Surface water	
Canada	PP	750	2.31E+00		
Canada	Others	750	1.54E+01		
Canada	PE	750	2.86E+01	Surface water	
Canada	PP	750	7.77E+00		
Canada	Others	750	5.19E+01		
Canada	PE	>1000	7.16E+01	Surface water	
Canada	PP	>1000	1.95E+01		
Canada	Others	>1000	1.30E+02		
Canada	PE	>1000	8.49E+00	Surface water	
Canada	PP	>1000	2.31E+00		
Canada	Others	>1000	1.54E+01		
Canada	PE	>1000	2.86E+01	Surface water	
Canada	PP	>1000	7.77E+00		
Canada	Others	>1000	5.19E+01		
United States		677,5		Surface water	(Baldwin et al. 2020)
United States		677,5		Surface water	
United States		677,5		Surface water	
Thailand	PE	281,5	7.82E+01	Surface water	(Pradit et al. 2023)
Thailand	Nylon	281,5	5.26E+01		
Thailand	PP	281,5	2.55E+01		
Thailand	PET	281,5	2.71E+01	Surface water	(Pradit et al. 2023)
Thailand	Rayon	281,5	2.27E+02		
Thailand	PE	281,5	1.85E+01		
Thailand	Nylon	281,5	3.21E+01		
Thailand	PP	281,5	8.27E+01		
Thailand	PET	281,5	4.96E+01		
Thailand	Rayon	281,5	5.06E+01		
Thailand	PDMS	281,5	1.65E+01		
Thailand	PE	281,5	4.86E+01	Surface water	
Thailand	PP	281,5	4.86E+01		
Thailand	PET	281,5	1.43E+02		
Thailand	PE	281,5	5.67E+01		
Thailand	PP	281,5	1.28E+02		
Thailand	PET	281,5	3.84E+01		
Thailand	PDMS	281,5	1.72E+01		
Thailand	PE+PP	281,5	1.92E+01		

Table SI. Continuation.

Thailand	PE	281,5	4.10E+01	Surface water	(Pradit et al. 2023)
Thailand	Nylon	281,5	2.76E+01		
Thailand	PP	281,5	1.34E+01		
Thailand	PET	281,5	1.42E+01		
Thailand	Rayon	281,5	1.19E+02		
Thailand	PE	281,5	1.22E+01	Surface water	
Thailand	Nylon	281,5	2.12E+01		
Thailand	PP	281,5	5.46E+01		
Thailand	PET	281,5	3.27E+01		
Thailand	Rayon	281,5	3.34E+01		
Thailand	PDMS	281,5	1.09E+01		
Thailand	PE	281,5	2.12E+01	Surface water	
Thailand	PP	281,5	2.13E+01		
Thailand	PET	281,5	6.25E+01		
Thailand	PE	281,5	1.63E+01	Surface water	
Thailand	PP	281,5	3.71E+01		
Thailand	PET	281,5	1.11E+01		
Thailand	PDMS	281,5	4.97E+00		
Thailand	PE+PP	281,5	5.54E+00		
Brazil	PE		2.15E+00	Surface water	(Drabinski et al. 2023)
Brazil	PEST		4.29E-01		
Brazil	ABS		4.29E-01	Surface water	
Brazil	PP		5.85E-01		
Brazil	PVFM		1.17E-01		
Brazil	Others		1.95E-01		
Brazil	PE		1.98E+00		
Brazil	PEST		3.96E-01		
Brazil	ABS		3.96E-01		
Brazil	PP		5.40E-01		
Brazil	PVFM		1.08E-01		
Brazil	Others		1.80E-01		
Brazil	PE		1.78E+02		
Brazil	PEST		3.55E+01		
Brazil	ABS		3.55E+01		
Brazil	PP		4.84E+01		
Brazil	PVFM		9.68E+00		
Brazil	Others		1.61E+01		

Table SI. Continuation.

Brazil	PE		6.49E+02	Surface water	(Drabinski et al. 2023)
Brazil	PEST		1.30E+02		
Brazil	ABS		1.30E+02		
Brazil	PP		1.77E+02		
Brazil	PVFM		3.54E+01		
Brazil	Others		5.90E+01		
Brazil	PE		1.99E+02	Surface water	
Brazil	PEST		3.99E+01		
Brazil	ABS		3.99E+01		
Brazil	PP		5.43E+01		
Brazil	PVFM		1.09E+01		
Brazil	Others		1.81E+01		
Brazil	PE		1.30E+01	Surface water	
Brazil	PEST		2.61E+00		
Brazil	ABS		2.61E+00		
Brazil	PP		3.56E+00		
Brazil	PVFM		7.11E-01		
Brazil	Others		1.19E+00		
Brazil	PE		1.79E+01	Surface water	
Brazil	PEST		3.58E+00		
Brazil	ABS		3.58E+00		
Brazil	PP		4.88E+00	Surface water	
Brazil	PVFM		9.75E-01		
Brazil	Others		1.63E+00		
Brazil	PE		6.44E+00		
Brazil	PEST		1.29E+00		
Brazil	ABS		1.29E+00		
Brazil	PP		1.76E+00		
Brazil	PVFM		3.51E-01		
Brazil	Others		5.85E-01		
Brazil	PE		3.91E+00	Surface water	
Brazil	PEST		7.81E-01		
Brazil	ABS		7.81E-01		
Brazil	PP		1.07E+00		
Brazil	PVFM		2.13E-01		
Brazil	Others		3.55E-01		

Table SI. Continuation.

Brazil	PE		9.68E+00	Surface water	(Drabinski et al. 2023)
Brazil	PEST		1.94E+00		
Brazil	ABS		1.94E+00		
Brazil	PP		2.64E+00		
Brazil	PVFM		5.28E-01		
Brazil	Others		8.80E-01		
Brazil	PE		3.29E+02	Surface water	
Brazil	PEST		6.58E+01		
Brazil	ABS		6.58E+01		
Brazil	PP		8.98E+01		
Brazil	PVFM		1.80E+01		
Brazil	Others		2.99E+01		
Brazil	PE		1.00E+02	Surface water	
Brazil	PEST		2.01E+01		
Brazil	ABS		2.01E+01		
Brazil	PP		2.74E+01		
Brazil	PVFM		5.48E+00		
Brazil	Others		9.13E+00		
Brazil	PE		4.71E+02		
Brazil	PEST		9.42E+01		
Brazil	ABS		9.42E+01		
Brazil	PP		1.28E+02		
Brazil	PVFM		2.57E+01	Surface water	
Brazil	Others		4.28E+01		
Brazil	PE		2.81E+04		
Brazil	PEST		5.63E+03		
Brazil	ABS		5.63E+03		
Brazil	PP		7.67E+03		
Brazil	PVFM		1.53E+03		
Brazil	Others		2.56E+03		
Nigeria				Surface water	(Chaukura et al. 2021)
Nigeria					
South Africa				Surface water	
South Africa					
Ghana		2550		Surface water	
Kenya		1325		Surface water	

Table SI. Continuation.

United States	PEST	55	1.37E+05	Surface water	(Scircle et al. 2020)
United States	PU	55	5.31E+04		
United States	PA	55	3.12E+04		
United States	PP	55	2.78E+04		
United States	PE	55	7.73E+03		
United States	POM	55	2.38E+04		
United States	PTFE	55	7.11E+03		
United States	PEST	55	1.12E+04		
United States	PU	55	2.33E+04		
United States	PA	55	7.92E+03		
United States	PP	55	4.29E+03		
United States	PE	55	2.86E+03		
United States	POM	55	4.95E+02		
United States	PTFE	55	4.40E+02		
United States	PEST	55	6.69E+04	Surface water	(Scircle et al. 2020)
United States	PU	55	1.39E+05		
United States	PA	55	4.72E+04		
United States	PP	55	2.56E+04		
United States	PE	55	1.71E+04		
United States	POM	55	2.95E+03		
United States	PTFE	55	2.62E+03		
United States	PEST	55	4.19E+04	Surface water	
United States	PU	55	5.67E+03		
United States	PA	55	1.05E+03		
United States	PP	55	4.95E+02		
United States	PE	55	3.85E+02		
United States	POM	55	2.92E+03		
United States	PTFE	55	1.54E+03		
United States	PEST	55	8.84E+04	Surface water	
United States	PU	55	1.19E+04		
United States	PA	55	2.20E+03		
United States	PP	55	1.04E+03		
United States	PE	55	8.12E+02		
United States	POM	55	6.15E+03		
United States	PTFE	55	3.25E+03		
United States	PEST	55	1.41E+04	Surface water	
United States	PU	55	1.18E+04		

Table SI. Continuation.

United States	PA	55	2.57E+03	Surface water	(Scircle et al. 2020)
United States	PP	55	6.24E+02		
United States	PE	55	2.22E+03		
United States	POM	55	1.29E+03		
United States	PTFE	55	2.57E+03		
United States	PEST	55	1.18E+05		
United States	PU	55	9.88E+04		
United States	PA	55	2.15E+04		
United States	PP	55	5.22E+03		
United States	PE	55	1.86E+04		
United States	POM	55	1.08E+04		
United States	PTFE	55	2.15E+04		
United States	PEST	55	1.48E+04	Surface water	
United States	PU	55	1.24E+04		
United States	PA	55	2.71E+03		
United States	PP	55	6.56E+02		
United States	PE	55	2.34E+03		
United States	POM	55	1.35E+03		
United States	PTFE	55	2.71E+03		
United States	PEST	55	9.49E+04		
United States	PU	55	7.97E+04		
United States	PA	55	1.74E+04		
United States	PP	55	4.21E+03		
United States	PE	55	1.50E+04		
United States	POM	55	8.68E+03		
United States	PTFE	55	1.74E+04		
Bolivia		5,63		Surface water	(Loayza et al. 2022)
Peru		5,63		Surface water	
United States		550		Wastewater	(Kabir et al. 2023)
United States		550		Wastewater	
United States		550		Wastewater	
United States		550		Wastewater	
United States		550		Wastewater	
United States		550		Wastewater	
United States		550		Wastewater	
United States		550		Wastewater	

Table SI. Continuation.

Spain	PVC	<355	2.09E+05	Wastewater	(Franco et al. 2020)
Spain	PE	<355	32000+13000		
Spain	PEMA	<355	2.00E+04		
Spain	PP	<355	1.40E+04		
Spain	SBR	<355	4.00E+03		
Spain	CPE	<355	8.50E+04		
Spain	PVC	<355	2.93E+05	Wastewater	
Spain	PEMA	<355	1.50E+04		
Spain	PP	<355	1.50E+04		
Spain	PE	<355	7.70E+04		
Spain	PEVA	<355	1.50E+04		
Spain	PA	<355	3.10E+04		
Spain	EAA	<355	1.39E+05		
Spain	PVC	<355	7.60E+04	Wastewater	
Spain	PS	<355	1.50E+04		
Spain	PE	<355	1.73E+05		
Spain	PET	<355	5.00E+03		
Spain	EAA	<355	5.00E+03		
Spain	PVC	<355	1.27E+05	Wastewater	
Spain	PEMA	<355	1.10E+04		
Spain	PP	<355	7.00E+03		
Spain	SBR	<355	7.00E+03		
Spain	PS	<355	8.70E+04		
Spain	PE	<355	8.20E+04		
Spain	PET	<355	7.00E+03		
Spain	PVC	<355	1.33E+05	Wastewater	
Spain	PE	<355	3.40E+04		
Spain	PEMA	<355	8.80E+04		
Spain	PP	<355	8.00E+03		
Spain	CPE	<355	1.40E+04		
Spain	PE	<355	1.40E+04	Wastewater	(Franco et al. 2020)
Spain	PEMA	<355	4.00E+03		
Spain	SBR	<355	9.00E+03		
Spain	PS	<355	5.60E+04		
Spain	PET	<355	5.00E+03		
Spain	PVC	<355	7.00E+03		
Spain	PE	<355	1.00E+03		

Table SI. Continuation.

Spain	PS	<355	2.00E+03	Wastewater	(Franco et al. 2020)
Spain	PA	<355	7.00E+03		
Mexico	PP	200			(Ramírez-Álvarez et al. 2020)
Mexico	PE	200			
Mexico	PE+PP	200			
Mexico	PVC	200			
Mexico	Cellophane	200			
Mexico	PP	200		Wastewater	
Mexico	PE	200			
Mexico	PE+PP	200			
Mexico	PVC	200			
Mexico	Cellophane	200			
Canada		>100		Wastewater	(Vermaire et al. 2017)
Canada		>100		Wastewater	
Vanuatu	PS	<5000	6.48E-02	Surface water	(Bakir et al. 2020)
Vanuatu	PE	<5000	1.26E-02		
Vanuatu	PP	<5000	9.00E-03		
Vanuatu	PEVA	<5000	1.80E-03		
Vanuatu	Others	<5000	1.80E-03		
Vanuatu	PS	<5000	2.02E-01	Surface water	
Vanuatu	PE	<5000	3.92E-02		
Vanuatu	PP	<5000	2.80E-02		
Vanuatu	PEVA	<5000	5.60E-03		(Bakir et al. 2020)
Vanuatu	Others	<5000	5.60E-03		
Vanuatu	PS	<5000	4.10E-01	Surface water	
Vanuatu	PE	<5000	7.98E-02		
Vanuatu	PP	<5000	5.70E-02		
Vanuatu	PEVA	<5000	1.14E-02		
Vanuatu	Others	<5000	1.14E-02		
China	PET	3	2.19E+06	Surface water	(Wang et al. 2020)
China	PE	3	7.66E+05		
China	PP	3	5.02E+05		
China	PAM	3	2.37E+04		
China	Others	3	2.79E+05		
China	PET	7,5	8.85E+05	Surface water	
China	PE	7,5	3.09E+05		
China	PP	7,5	2.03E+05		

Table SI. Continuation.

China	PAM	7,5	9.57E+03	Surface water	(Wang et al. 2020)
China	Others	7,5	1.13E+05		
China	PET	30	4.26E+05		
China	PE	30	1.49E+05		
China	PP	30	9.75E+04		
China	PAM	30	4.61E+03		
China	Others	30	5.42E+04		
China	PET	75	2.21E+05	Surface water	
China	PE	75	7.72E+04		
China	PP	75	5.06E+04		
China	PAM	75	2.39E+03		
China	Others	75	2.81E+04		
China	PET	>100	1.31E+05	Surface water	
China	PE	>100	4.56E+04		
China	PP	>100	2.99E+04		
China	PAM	>100	1.41E+03		
China	Others	>100	1.66E+04		

Table SII. MP remediation by adsorption.

Biomass-based absorbent	MP type	MP size	Adsorption mechanism	Removal efficiency	Reference
Magnetic-Corn cob biochar	Pristine polyamide, Aged Polyamide	75 µm	Complexation, hydrophobic, and electrostatic interactions	25%	(Li et al. 2023)
Jujube waste-derived biochar	Polyethylene	-	Hydrophobic, electrostatic, Physical sorption, and surface complexation	99%	(Ahmad et al. 2023)
Oat protein sponge	Polystyrene	1 µm	Hydrophobic interactions and intraparticle diffusion	81.2%	(Wang et al. 2021b)
Hardwood vessel chitosan-based sponge	Polystyrene	-	Electrostatic, conjugate interactions, physical sorption, intraparticle diffusion	47.30%	(Xu et al. 2023)
Fe3O4- polydimethylsiloxane (PDMS)/ halloysite-PDMS@ PDMS coated sponge	PP-100	150 µm	Intraparticle diffusion under capillary action, electrostatic interaction, and hydrogen bond interaction	100%	(Rong et al. 2022)
	PVC-100	150 µm		100%	
	PE-500	250 µm		100%	
	PP-200	6.5 µm		100%	
Nano-Fe3O4	Polyethylene Polypropylene Polystyrene Polyethylene terephthalate	200-900 µm	Electrostatic interaction and hydrophobic interaction	79-94%	(Shi et al. 2022)
Fe3O4 nanoparticles	Polystyrene	1 µm	Hydrophobic interactions and electrostatic interactions	99.44%	(Heo et al. 2022)
Cellulose benzoate modified Magnetic carbon nanotubes	Polystyrene	10 µm	π-π interaction, electrostatic interaction	97%	(Liu & Wang 2023)
CNF-modified aerogel quaternary ammonium	Polystyrene	1 µm	-	~99%	(Zhuang et al. 2022)
Mg/Zn modified magnetic biochar	Polystyrene	1 µm	Electrostatic interaction and chemical bonding interaction	94.81–99.46%	(Wang et al. 2021b)
Chitin/graphene oxide sponges	Polystyrene	1 µm	Electrostatic interactions, hydrogen bond, and π π interactions	72.4–89.8 %	(Sun et al. 2020)
Corn straw and a hardwood biochar	Polystyrene	10 µm	Stuck, trapped, and entangled	>95%	(Wang et al. 2020a)
Three-dimensional reduced graphene oxide aerogel	Polystyrene	5 µm	Electrostatic interaction, physical retention and π-π interaction	66.73–89.04%	(Yuan et al. 2020)
MOF-based coated sponge	PP-2000	6.5 µm	p-π conjugation, Hydrogen bonding and Vander Walls forces	98%	(Chen et al. 2023a)
	PP-100	150 µm			
Magnetic carbon nanotubes	Polyethylene Polyethylene terephthalate Polyamide	48 µm	Hydrophobic interaction, π-π interaction, complexation, electrostatic interaction, and hydrogen-bond	100%	(Tang et al. 2021)
Magnetic biochar (MRB)	Polyethylene	-	Hydrogen bond, electrostatic repulsion, surface complexation, π π interactions	99.96%	(Wu et al. 2022)

Adapted from: (Verma et al. 2024).

Table SIII. MPs degradation processes.

Degradation process	MP type	Main results	References
Biodegradation	PE	14.7% MPs weight loss; 22.8% particle diameter decrease	(Park & Kim 2019)
Biodegradation	PET	0.88–1.5% crystallinity increase; 0.2 –0.3 optical density increase; 47– 78% diameter decrease; terephthalic acid production and degradation	(Gong et al. 2018)
Wet oxidation	PSPE	0.30–0.75 carbonyl index increase; 0.20–0.25O/C ratio increase	(Liu et al. 2019)
Fenton reaction	PSPE	0.05–0.15 carbonyl index increase;0.10–0.15O/C ratio increase	(Tagg et al. 2017)
Fenton reaction	PE, PE, PVC	No changes in functional groups observed by FTIR	
Electro-Fenton process	PVC	80% dechlorination	(Miao et al. 2020)
UV irradiation	LDPE	12.2– 68% tensile strength decrease; C–H bonds break; waviness and roughness increase; cracks and pores generation; decreased % C	(Ranjan & Goel 2019)
UV radiation	Differents MPs	OH and C =O groups generation; cracks and flakes generation	
Photocatalysis	LDPE	0.71–1.49 carbonyl index increase; 0.51–1.35 vinyl index increase	(Tofa et al. 2019)
Photocatalysis	HDPE	6% mass loss	(Ariza-Tarazona et al. 2019)
Photocatalysis	HDPE	– 75% mass loss	(Ariza-Tarazona et al. 2020)
Photocatalysis	PE	6% mass loss	(Jiang et al. 2021)
Photocatalysis	HDPE; LDPE	4.65 and 1.8% mass loss of HDPE and LDPE, respectively	(Llorente-García et al. 2020)
Photocatalysis	PP	65% volume reduction	(Uheida et al. 2021)
Mg@NCNTs/PMS	Differents MPs	5–50% weight loss; morphology modifications; functional groups modification; by-products generation	(Kang et al. 2019)

Adapted from: (Rodríguez-Narvaez et al. 2021).

Table SIV. MP occurrence in wastewater in different locations around the world.

Local	Concentration (MP/L)	Reference
Australia	2.2	(Ziajahromi et al. 2017)
Australia	11.8	(Raju et al. 2020)
Australia	55.3	(Fan et al. 2023)
Australia	42.5	
Australia	92	(Ziajahromi et al. 2021)
Australia	98	
Australia	55	
Australia	11.8	(Raju et al. 2020)
Canada	31	(Gies et al. 2018)
China	79.9	(Liu et al. 2019)
China	2.06	(Ruan et al. 2019)
China	1.01	
China	38	(Long et al. 2023)
China	41.33	
China	64.4	(Huang et al. 2023)
China	50.7	
China	32.5	(Zhang et al. 2023)
China	0.28	(Lv et al. 2019)
China	36.2	(Luo et al. 2023)
China	141.5	
China	101.9	(Meng et al. 2023)
China	20.1	
China	32.5	(Zhang et al. 2023)
China	15.46	(Dong et al. 2022)
China	219.5	(Bao et al. 2022)
China	70	(Long et al. 2023)
China	54.3	
China	10	(Yuan et al. 2021)
China	22	
China	8.72	(Zhang et al. 2021)
China	1.7	
China	0.7	
China	126	(Jiang et al. 2020)
China	16	(Ren et al. 2020)
China	12	(Yang et al. 2019)
China	80.5	(Tang et al. 2020)

Table SIV. Continuation.

China	126	(Jiang et al. 2020)
China	8.72	(Zhang et al. 2021)
Finland	57.6	(Lares et al. 2018)
Finland	6.9	(Talvitie et al. 2017)
Finland	61	_(Salmi et al. 2021)
Finland	57.6	(Lares et al. 2018)
France	244	(Kazour et al. 2019)
India	42.3	(Parashar & Hait 2023)
India	41.7	
India	56	
India	149.6	
India	72.7	
India	43	
India	60.3	
India	64.3	(Parashar & Hait 2022)
Iran	9.2	(Takdastan et al. 2021)
Iran	843.2	(Sharifi et al. 2023)
Iran	180	(Oveisy et al. 2022)
Iran	9.2	(Takdastan et al. 2021)
Iran	2.04	(Naji et al. 2021)
Israel	129.7	(Ben-David et al. 2021)
Italy	3.64	(Pittura et al. 2021)
Italy	3.64	(Tadsuwan & Babel 2021)
Italy	2.5	(Magni et al. 2019)
Korea	4200	(Hidayaturrahman & Lee 2019)
Korea	31400	
Korea	5840	
Morocco	25	(Hajji et al. 2023)
Morocco	42	
Morocco	26	
Morocco	92	
Morocco	29	
Morocco	53	
Morocco	126	
Morocco	252	
Netherlands	73	(Leslie et al. 2017)
Scotland	15.7	(Murphy et al. 2016)

Table SIV. Continuation.

South Korea	114	(Kim et al. 2022a)
South Korea	164	
South Korea	15465	(Kwon et al. 2022)
South Korea	8400	
South Korea	6960	
South Korea	4200	(Hidayaturrahman & Lee 2019)
South Korea	31400	
South Korea	5840	
Spain	4.4	(Bayo et al. 2020)
Spain	11.1	(Bretas Alvim et al. 2020)
Spain	12.43	(Bayo et al. 2020)
Spain	625.8	(González-Camejo et al. 2023a)
Spain	379	(Martín-García et al. 2023)
Spain	16.1	(Menéndez-Manjón et al. 2022)
Spain	793	(Martín-García et al. 2023)
Spain	173	
Spain	727	
Spain	92	
Spain	358	
Thailand	77	(Tadsuwan & Babel 2021)
Thailand	77	(Tadsuwan & Babel 2022)
Thailand	16.55	
Thailand	77	(Tadsuwan & Babel 2022)
Thailand	26.6	(Tadsuwan & Babel 2021)_
Turkey	30.7	(Bilgin et al. 2020)
Turkey	135.3	(Üstün et al. 2022)
Turkey	72.6	(Vardar et al. 2021)
Turkey	30.7	(Bilgin et al. 2020)
Turkey	3.1	(Akarsu et al. 2020)
Turkey	2.6	
Turkey	1.5	
Turkey	36	(Gündoğdu et al. 2018)
United States	133	_(Michielssen et al. 2016)
United States	94	
USA	19.7	(Gao et al. 2022)
Vietnam	578	(Van Do et al. 2022)
Vietnam	667	
Vietnam	1240	

Table SV. Removal of MP by various wastewater treatment technologies.

Treatment processes	Overall removal efficiency (%)	Treatment stage	Removal efficiency by stage (%)	Matrix type	Influent concentration (MP/L)	Effluent concentration (MP/L)	Reference
Primary / Membrane Bioreactor	25	-	-	Wastewater	68	51	(Leslie et al. 2017)
Screening / Grit chamber / Primary clarification / Activated sludge / Secundary clarification / Chlorination disinfection	95.6	Screening / Grit chamber	58.6	Wastewater	133	5.9	(Michielssen et al. 2016)_
		Primary clarification	61.6				
		Activated sludge / Secundary clarification	60.9				
		Chlorination disinfection	28.6				
Screening / Grit chamber / Primary clarification / Trickling filter/ Secundary clarification / Activated sludge / Tertiary filter / Chlorination disinfection	97.2	Screening / Grit chamber	35.1	Wastewater	94	2.6	
		Primary clarification	82.1				
		Trickling filter/ Secundary clarification / Activated sludge	11.9				
		Tertiary filter / Chlorination disinfection	72.7				
Screening / Anaerobic membrane bioreactor / Ceramic disc membrane unit	99.4	Screening	35.1	Wastewater	94	0.5	
		Anaerobic membrane bioreactor / Ceramic disc membrane unit	99.1				
Screening / Grit separation / Primary clarification Membrane Bioreactor	99.30	Screening / Grit separation / Primary clarification	99	Wastewater	57.6	0.4	(Lares et al. 2018)
		Membrane Bioreactor	99.31				
Screening / Grit separation / Primary clarification / Aeration / Final sedimentation / Disinfection	98.30	Screening / Grit separation / Primary clarification	99	Wastewater	57.6	1	
Screening and sedimentation / Biological treatment / Flocculation / Disinfection / De-chlorination processes / Ultrafiltration / Reverse osmosis	90.50	-	-	Wastewater	2.2	0.21	(Ziajahromi et al. 2017)

Table SV. Continuation.

Secundary / Discfilter with pore size 10 µm	-	Discfilter with pore size 10 µm	40	Wastewater	0.5	0.3	(Talvitie et al. 2017)
Secundary / Discfilter with pore size 20 µm	-	Discfilter with pore size 20 µm	98.5	Wastewater	2	0.03	
Secundary / Rapid sand filters	-	Rapid sand filters	97.1	Wastewater	0.7	0.02	
Secundary / Dissolved air flotation	-	Dissolved air flotation	95	Wastewater	2	0.1	
Primary / Secondary / Ceramic microfiltration	-	Ceramic microfiltration	72	Wastewater	-	0	(Takeuchi et al. 2023)
Microfiltration	100.00	-	-	Wastewater	-	0	(Bitter et al. 2022)
Pile cloth media filtration	99.99	-	-	Wastewater	-	-	
Clarifier / Powdered activated carbon / Rapid sand filter	97.15	-	-	Wastewater	-	-	
Granulated activated carbon	1.90	-	-	Wastewater	-	-	
Rapid sand filter	82.38	-	-	Wastewater	-	-	
Screen / Grit / Primary sedimentaion / Activated sludge / Final clarifier / Sand filtration /	99.40	-	-	Wastewater	-	4.3	(Wolff et al. 2020)
Coarse screen / Grit chamber and fine screen / Activated sludge / Final clarifier / Post aeration / Ultrafiltration	96.97	Coarse screen	0	Wastewater	77	2.3	(Tadsuwan & Babel 2022)
		Grit chamber and fine screen	25.55				
		Final clarifier / Post aeration	81.9				
		Ultrafiltration	78.16				
Screening / Grit chamber / Anoxic-aerobic / Clarifier / Ultrafiltration	96.97	Screening / Grit chamber	25.55	Wastewater	77	2.33	(Tadsuwan & Babel 2022)
		Anoxic-aerobic / Clarifier	81.91				
		Ultrafiltration	78.16				
Screening / Grit chamber / Activated sludge / Clarifier	78.73	Screening / Grit chamber	47.13	Wastewater	16.55	3.52	
		Activated sludge / Clarifier	59.77				
Screening / Lamination tank / Anaerobic -Anoxic - Aerobic / Submerged membrane bioreactor	-	Submerged membrane bioreactor	79	Wastewater	4.4	0.9	(Bayo et al. 2020)
Screening / Grit chamber / Primary clarifier / Activated sludge / Secundary clarifier / Rapid sand filters	-	Rapid sand filters	75.5	Wastewater	4.4	1.08	
Primary sedimentation / Secundary sedimentation / Activated sludge	-	Activated sludge	74.8	Wastewater	-	2.8	(Bretas Alvim et al. 2020)
Rapid Gravity Filtration	39.5	-	-	Wastewater	-	0.17	(González-Camejo et al. 2023)

Table SV. Continuation.

Grit chamber / Primary sedimentation	74.00	-	-	Wastewater	12.43	3.21	(Bayo et al. 2020)
Screening / Grit chamber / Upflow anaerobic sludge blanket / Anaerobic membrane bioreactor	94.50	Upflow anaerobic sludge blanket	52.7	Wastewater	3.64	0.2	(Pittura et al. 2021)
		Anaerobic membrane bioreactor	88.4				
Screening / Grit chamber / Primary clarifier / Activated sludge / Secondary clarifier / Disinfection	86.00	Primary settler	47.8	Wastewater	3.64	0.52	
		Activated sludge / Secondary settler	60				
		Desinfection	31.6				
Coarse grid / Fine gride / Aerated grit chamber / Primary sedimentation tank / Anaerobic - Anoxic - Aerobic / Secundary sedimentation tank / Chlorination disinfection	64.50	Coarse grid / Fine gride / Aerated grit chamber / Primary sedimentation tank	40.7	Wastewater	79.9	28.4	(Liu et al. 2019)
		Anaerobic - Anoxic - Aerobic / Secundary sedimentation tank	28	Wastewater			
		Chlorination disinfection	16.7	Wastewater			
Screening / Grit chamber / Activated Biological Filters / Activated sludge / Clarifier / UV Disinfection	77.1	Screening / Grit chamber	55.7	Wastewater	11.8	2.7	(Raju et al. 2020)
		Activated Biological Filters / Activated sludge / Clarifier / UV Desinfection	48.4	Wastewater			
Facultative lagoon / Maturation lagoon / Winter storage lagoons	96.9	Facultative lagoon	47	Wastewater	55.3	1.7	(Fan et al. 2023)
		Maturation lagoon	76.1				
		Winter storage lagoons	75.7				
Primary sedimentation / Activated sludge / Aeration lagoon / Maturation lagoon / Storage lagoon	98.4	Primary sedimentation	55	Wastewater	42.5	0.7	
		Activated sludge	45				
		Aeration lagoon	75.2				
		Maturation lagoon / Storage lagoon	73.1				
Screening / Primary clarifier / Trickling filter / Activated sludge / Chlorination	89.6	Screening / Primary clarifier	27.4	Wastewater	42.3	4.4	(Parashar & Hait 2023)
		Trickling filter	43.6				
		Chlorination	79.4				
Screening / Grit chamber / Upflow anaerobic sludge blanket / Aeration tank / Disinfection	87.3	Screening / Grit chamber	26.6	Wastewater	41.7	5.3	
		Upflow anaerobic sludge blanket	23.9				
		Desinfection	80.4				

Table SV. Continuation.

Screening / Grit chamber / Sequencing batch reactors / UV system	93.9	Screening / Grit chamber	42.1	Wastewater	56	3.4	(Parashar & Hait 2023)
		Sequencing batch reactors	63				
		UV system	71.7				
Screening / Grit chamber / Primary clarifier / Aeration tank / Secundary clarifier / Disinfection	85.2	Screening / Grit chamber / Primary clarifier	33.3	Wastewater	149.6	22.2	
		Secundary clarifier	58				
		Desinfection	63.8				
Screening / Grit chamber / Fluidized aerobic bioreator / Tube settler	84.5	Screening / Grit chamber	25.3	Wastewater	72.7	11.3	
		Fluidized aerobic bioreator	55.8				
		Tube settler	52.9				
Screening / Grit chamber / Primary clarifier / Aerated lagoon / Secundary clarifier / Disinfection	88.4	Screening / Grit chamber	22.3	Wastewater	43	5	
		Primary clarifier	70				
		Aerated lagoon	69.5				
		Secundary clarifier / Desinfection	51				
Screening / Skimming tank / Primary clarifier / Bio tower-based / Aeration tank / Secundary clarifier	77.3	Screening / Skimming tank / Primary clarifier	30.8	Wastewater	60.3	13.7	
		Bio tower-based	35.3				
		Secundary clarifier	63.6				
Activated sludge / Coagulation-flocculation using ferric chloride	-	Coagulation-flocculation with ferric chloride	99.4	Wastewater	-	-	(Rajala et al. 2020)
Activated sludge / Coagulation-flocculation using polyaluminum chloride	-	Coagulation-flocculation with polyaluminum chloride	98.2	Wastewater	-	-	
Disc filters / Rapid sand filters / Dissolved air flotation / Membrane bioreactor		Disc filters	40	Wastewater	0.5	0.3	(Talvitie et al. 2017)
		Rapid sand filters	97		0.7	0.02	
		Dissolved air flotation	95		2.0	0.1	
		Membrane bioreactor	99.9		6.9	0.005	
Grit chamber / Primary settling / Bioreactor / Secondary settling / Coagulation using polyaluminum chloride / Ozonization	99.2	Grit chamber / Primary settling	62.7	Industrial wastewater	4200	33	(Hidayaturrahman & Lee 2019)
		Bioreactor / Secondary settling	54.7				
		Coagulation using polyaluminum chloride	77				
		Ozonization	79.9				

Table SV. Continuation.

Grit chamber / Primary settling / Bioreactor / Secondary settling / Coagulation using polyaluminum chloride / Membrane disc-filter	99.1	Grit chamber / Primary settling	59.9	Wastewater	31400	297	(Hidayaturrahman & Lee 2019)
		Bioreactor / Secondary settling	37.5				
		Coagulation using polyaluminum chloride	81.6				
		Membrane disc-filter	79.4				
Grit chamber / Primary settling /Bioreactor / Secondary settling / Coagulation using polyaluminum chloride / Rapid sand filtration	98.9	Grit chamber / Primary settling	64.4	Wastewater	5840	66	
		Bioreactor / Secondary settling	79.2				
		Coagulation using polyaluminum chloride	47.1				
		Rapid sand filtration	69.3				
Grit removal / Anaerobic-anoxic-aerobic / Two-stage sedimentation / Rapid sand filtration	99.8	-	-	Wastewater	114	0.26	(Kim et al. 2022)
Screening / Degritting / Primary sedimentation / Activated sludge / UV desinfection	86.9	Screening / Degritting / Primary sedimentation	41.7	Wastewater	2.06	0.27	(Ruan et al. 2019)
		Activated sludge	77.5				
Screening / Mixing chamber / Flocculation / Sedimentation / Chlorination	60.4	Mixing chamber / Flocculation / Sedimentation	78.2	Wastewater	1.01	0.4	
Screening / Primary clarifier / Activated sludge / Secondary clarifiers / Rapid sand filtration / Disinfection	94.6	Screening / Primary clarifier / Activated sludge / Secondary clarifiers /	88.2	Wastewater	129.7	7.3	(Ben-David et al. 2021)
		Rapid sand filtration / Disinfection	94.4				
Coarse screens / Fine screens / Aerated grit chambers / Activated sludge	79.5	Coarse screens / Fine screens / Aerated grit chambers	30	Wastewater	30.7	6.3	(Bilgin et al. 2020)
		Activated sludge	71				
Screening / Grit chamber / Modified sequencing batch reactor / Denitrification filter / Constructed wetland	87.7	Screening / Grit chamber	46.5	Wastewater	38	4.67	(Long et al. 2023)
		Modified sequencing batch reactor	21.3				
		Denitrification filter	35.4				
		Constructed wetland	54.8				

Table SV. Continuation.

Screening / Grit chamber / Modified sequencing batch reactor / Micro-flocculation filtration / UV disinfection	80.6	Screening / Grit chamber	53.2	Wastewater	41.33	8	(Long et al. 2023)
		Modified sequencing batch reactor	18.9				
		Micro-flocculation filtration	19.1				
		UV disinfection	36.9				
Aerated grit chamber / Sedimentation tank / High density sedimentation tank / Filter cloth tank	93.81	Aerated grit chamber	52.2	Industrial wastewater	64.4	4	(Huang et al. 2023)
		Sedimentation tank	66.3				
		High density sedimentation tank / Filter cloth tank	61.58				
Grit chamber / Sedimentation tank / Denitrifying filter / UV disinfection	88.1	Grit chamber	50	Wastewater	50.7	5.59	
		Sedimentation tank	68.1				
		Denitrifying filter / UV disinfection	30.4				
Coarse grille / Fine gtille / Cyclone / Aeration grit / Sequencing batch reactor activated sludge process / A2O / CAST / High-efficiency sedimentation tanks / Activated sand filters / Denitrification filters / Disinfection tanks	84.6	Coarse grille / Fine gtille / Cyclone / Aeration grit	73.0	Wastewater	32.5	5.0	(Zhang et al. 2023)
		Sequencing batch reactor activated sludge process / A2O / CAST	76.5				
		High-efficiency sedimentation tanks / Activated sand filters / Denitrification filters / Disinfection tanks	83.9				
Screening/ Primary sedimentation/ Secondary sedimentation	90.87	-	-	Domestic wastewater, urban runoff, industrial operations, and commercial enterprises.	9.2	0.84	(Takdastan et al. 2021)_
Primary settlement/ Activated biological anoxic/ Activated biological aerobic	76.9	-	-	Wastewater	-	1.5	(Tagg et al. 2020)
Primary / Anaerobic Membrane Bioreactor	99.1	-	-	Wastewater	92	0.8	(Michielssen et al. 2016)
Primary / Membrane Bioreactor	99.4	-	-	Wastewater	57.6	1	(Lares et al. 2018)
Primary / Membrane Bioreactor	94	-	-	Wastewater	6.9	0.2	(Talvitie et al. 2017)

Table SV. Continuation.

Primary sedimentation / Conventional activated sludge with nitrification-denitrification / UF (Membrane bioreactor)	100	-	-	Wastewater	625.8	0	(González-Camejo et al. 2023)
Membrane bioreactor	88	-	-	Wastewater	52000	5043	(Yang et al. 2023)
Membrane bioreactor with two-stage Anoxic/Oxic	50	-	-	Wastewater	1.2	50	(Zhang et al. 2021)
Primary: grit chambers / Secundary: Anaerobic/ anoxic/aerobic activated sludge with membrane bioreactor	82.1	-	-	Wastewater	0.28	0.05	(Lv et al. 2019)
Primary / Membrane Bioreactor	96	-	-	Wastewater	-	-	(Takeuchi et al. 2023)
Primary / Membrane Bioreactor	96.97	-	-	Wastewater	77	-	(Tadsuwan & Babel 2022)
Ultrafiltration	75	-	-	Wastewater	1.2	-	(Zhang et al. 2021)

Table SVI. Acute and chronic risk quotient (RQ) related to MPs for raw wastewater (RWW) and treated wastewater (TWW) for various wastewater treatment technologies. Color identification: medium risk (yellow), low risk (green), negligible risk (blue); no risk (white).

WW treatment process	MP' Polymer	Acute RQ		Chronic RQ	
		RWW	TWW	RWW	TWW
Screening / Grit separation / Primary clarification / Membrane Bioreactor	PE	0.04670270	0.00037838	0.00013407	1.086E-06
Screening / Grit separation / Primary clarification / Aeration / Final sedimentation / Disinfection	PE	0.04670270	0.00459459	0.00013407	1.319E-05
Screening and sedimentation / Biological treatment / Flocculation / Disinfection / De-chlorination processes / Ultrafiltration / Reverse osmosis	PE	0.01248649		0.00003584	
	PET	0.11293055	0.02635046	0.00000485	1.132E-06
	PS	0.00012222	0.00000933	0.00086394	6.597E-05
	PP	0.00004946		0.00008628	
Secundary / Disc filter with pore size 10 µm	PE	0.00097973	0.00135000	0.00000281	3.875E-06
Secundary / Disc filter with pore size 20 µm	PVC	0.00086652		0.00000312	
Secundary / Rapid sand filters	PE	0.00293243	0.00007676	0.00000842	2.203E-07
	PVC	0.00015118	0.00000050	0.00000054	1.801E-09
Secundary / Dissolved air flotation	PE	0.01270270	0.00016216	0.00003646	4.655E-07
Screening / Lamination tank / Anaerobic -Anoxic - Aerobic / Submerged membrane bioreactor	PE	0.04043243		0.00011607	
	PP	0.00006120		0.00010677	
Screening / Grit chamber / Primary clarifier / Activated sludge / Secundary clarifier / Rapid sand filters	PE	0.04043243	0.00036049	0.00011607	1.035E-06
	PP	0.00006120		0.00010677	
	PS	0.00006519		0.00046077	
Screening / Grit chamber / Upflow anaerobic sludge blanket / Anaerobic membrane bioreactor	PE	0.02607027		0.00007484	

Table SVI. Continuation.

Screening / Grit chamber / Primary clarifier / Activated sludge / Secondary clarifier / Disinfection	PE	0.02115135	0.00119459	0.00006072	3.429E-06
	PP	0.00013297		0.00023198	
Screening / Grit chamber / Activated Biological Filters / Activated sludge / Clarifier / UV Disinfection	PP	0.00119038	0.00018437	0.00207672	3.216E-04
	PET	0.18945525		0.00000814	
	PA	0.00431671	0.00123924	0.00317998	9.129E-04
	PVC	0.00108776		0.00000391	
	PS	0.00021415		0.00151372	
Disc filter	PE	0.00097973	0.00135122	0.00000281	3.879E-06
Rapid sand filters	PE	0.00293149		0.00000842	
	PVC	0.00015072	0.00000049	0.00000054	1.763E-09
Dissolved air flotation	PE	0.01272432	0.00016216	0.00003653	4.655E-07
	PP	0.00004946	0.00000247	0.00008628	4.314E-06
Membrane bioreactor	PE	0.01118919	0.00000231	0.00003212	6.633E-09
	PP	0.00001706	0.00000022	0.00002977	3.873E-07
	PS	0.00004293		0.00030348	
Primary / Membrane Bioreactor	PE	0.03891892	0.00472973	0.00011172	1.358E-05
	PA	0.00460577	0.00003998	0.00339292	2.945E-05
Primary / Membrane Bioreactor	PE	0.01305405	0.00270270	0.00003747	7.758E-06
Primary: screen and grit chamber / Upflow anaerobic sludge blanket / Anaerobic membrane bioreactor	PE	0.01967568	0.00045946	0.00005648	1.319E-06
	PP	0.00015343		0.00026767	
Primary / Secundary: Anoxic tank / Biological reactor / Tertiary: Submerged membrane bioreactor	PE	0.04596216		0.00013194	
	PA	0.00045034		0.00033175	
	PP	0.00006429		0.00011217	
	PS	0.00006910		0.00048841	
Membrane Bioreactor	PE	0.03891892	0.00472973	0.00011172	1.358E-05
	PA	0.00460577	0.00003998	0.00339292	2.945E-05